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EARLY CHILDHOOD CLASSROOM QUALITY AND PRESCHOOL LEARNING  
BEHAVIORS

A Dissertation

Submitted to the School of Education

Duquesne University

In partial fulfillment of the requirements for  
the degree of Doctor of Philosophy

By

Steven P. Kachmar

May 2008

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Steven P. Kachmar

2008

**DUQUESNE UNIVERSITY**  
**SCHOOL OF EDUCATION**  
**Department of Counseling, Psychology and Special Education**

***Dissertation***

Submitted in Partial Fulfillment of the Requirements  
For the Degree of Doctor of Philosophy

**School Psychology Doctoral Program**

***Presented by:***

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B.A. Psychology, Kutztown University of Pennsylvania, 2000  
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**February 5, 2008**

**EARLY CHILDHOOD CLASSROOM QUALITY AND  
PRESCHOOL LEARNING BEHAVIORS**

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# ABSTRACT

## EARLY CHILDHOOD CLASSROOM QUALITY AND PRESCHOOL LEARNING BEHAVIORS

By

Steven P. Kachmar

May 2008

Dissertation Supervised by Kara E. McGoe, Ph.D., NCSP

The intelligence quotient (IQ) continues to dominate educational decision-making although it lacks descriptive quality indicative of how children learn best and precisely what contributes to learning differences among children. Researchers have advocated for the use of alternative assessment methods to describe differences in children's learning. Limited research has been conducted in this area yet is supportive of learning behavior as an influential factor associated with scholastic achievement. Unfortunately, little research has been conducted on preschool learning behaviors, despite their link to positive child outcomes. Early childhood environments have similarly been linked to children's scholastic success and positive outcomes.

This study examined the relationships between early childhood program quality, preschool learning behaviors, and early scholastic achievement among 123 preschool

aged children enrolled in high, medium and low quality early childhood programs in western Pennsylvania. The Early Childhood Environment Rating Scale – Revised (ECERS-R) was used to evaluate program quality, while preschool learning behavior was assessed by the teacher completed Preschool Learning Behaviors Scale (PLBS). The Basic School Skills Inventory-Third Edition (BSSI-3) was utilized to assess child competencies across the academic domains of reading, writing, mathematics, and spoken language. Additional measures were utilized to determine convergent validity for the PLBS. Analyses sought to verify the factor structure and validity of the PLBS, and to determine whether children participating in programs of varying quality differed in learning behavior development and scholastic achievement. Regression analyses were employed to determine which classroom quality factors were predictive of learning behavior. The potential mediating effect of learning behavior on the classroom quality-scholastic outcome relationship was also tested.

Results of the study provide support for the validity of the PLBS, however results of factor analyses did not comport with previous findings. Results indicated that children participating in classrooms of various quality did not significantly differ in the quality of their learning behavior. However, significant differences were found among quality groups across areas of early scholastic achievement. Regression analyses indicated that two ECERS-R factors were predictive of learning behavior, and that preschool learning behavior had no mediating effect on the quality-achievement relationship. Suggestions for future research are provided.

## DEDICATION

To the girl I met in homeroom and the little boy I met up north. There just aren't enough words.

## ACKNOWLEDGEMENT

Since this dissertation is the culmination of my doctoral studies at Duquesne University, I would like to acknowledge and recognize those people that were instrumental in its completion, as well as those who have played an influential role in my professional development and personal growth.

First, I would like to thank my committee for their input and guidance throughout this process. Dr. Kara McGoey, my committee chair, you provided the patience and clear-headed answers I needed since day one. I am deeply grateful for all of the time you devoted to my dissertation, the constructive feedback you provided, and the support. I am also grateful for the guidance you provided to me over the last three years. Thank you for keeping me sane. I am also grateful to Dr. Jeffery Miller for serving on my committee and devoting so much time to making this a better study, and for ensuring that I understood the statistics. I would also like to express my gratitude for your patience and honesty in advising me the last few years and for answering all of my questions. I would also like to express my gratitude to Dr. Stephen J. Bagnato for agreeing to serve on my committee, for taking the time out of his hectic schedule and for providing invaluable feedback. Last, but certainly not least, I would like to thank Dr. Anita Meehan for being there when I needed guidance in writing this dissertation and over the previous ten years. If it was not for all that you did to move me in the right direction, I do not know where I'd be.

Second, I would like to thank Kristin Rezzetano, for taking a tremendous amount of time out of her schedule and away from her studies to assist with the data collection



for this dissertation. The completion of this project could not have been possible without your help. Best wishes in your studies and future goals. I would also like to acknowledge and thank Dr. Paul McDermott for granting me permission to use the Preschool Learning Behavior Scale and for discussing the concept with me at length. Also, I would like to thank Dr. Joseph Kush for taking the time and having the interest to let me use some of his contacts. Finally, I would like to thank each of the eleven preschools that participated in this study. I greatly appreciate the tremendous amount of time and effort your staff devoted to this project, and for making me feel welcome.

I would also like to thank those individuals significant to me in my personal life without whom this feat could not have been accomplished. To my first teachers, my parents, Stephen and Kathryn Kachmar, thank you for your unconditional love and timeless support. I would also like to thank my wife, Keri Kachmar, for her love, support and humor. Thank you for being there through everything. Without all you have done I would never be where I am.

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# CHAPTER I

## INTRODUCTION

Scholastic achievement has and continues to be the lynchpin of American society. Over time, the necessity of high educational achievement among school-aged children has been supported through education initiatives, the refinement of state education standards and by federal legislation. Recently, the importance of educational achievement was further bolstered by the reauthorization of the *No Child Left Behind Act* of 2001 (U.S. Department of Education, 2001). This piece of federal legislation has served to centralize the nation's educational system through high-stakes testing to gauge adequate educational progress and ensure that schools take appropriate steps to guarantee that every child develops essential knowledge and skills. Collaterally, the nation's educational system has been met with numerous challenges. The primary challenge is that of ensuring that each kindergarten class enters school ready to learn, and that those young children who are under-performing are identified early and that future academic difficulty is thwarted through appropriate intervention. This emphasis on school readiness and the identification of early academic problems pose unique complexities to the educational system as young children poised to enter school greatly differ in their developmental trajectories, home life, socioeconomic status, and prior exposure to educational instruction; all factors which may impact scholastic achievement.

Considering the individual differences of young children, the shift in the American landscape with more mothers working, a strong research base underscoring the importance of early childhood educational experiences, and the necessity of early identification and intervention of learning difficulties, the duty of ensuring that children

enter school ready to learn often becomes the responsibility of nursery schools, preschools, and day care centers. Traditionally, these centers have been environments for exploration, socialization, and care, with children actively partaking in a wide array of activities. Programmatic focus has been disparate; with childcare centers serving almost exclusively as care facilities for working parents, while preschool centers often defined their programmatic structure as grounded in the social and academic development of children (National Research Council, 2001). Over the past 30 years, a pedagogical shift has occurred among these centers. This shift has led programs to define their goals using education terminology, focusing on the importance of quality program conceptualization, implementation and evaluation, and has placed emphasis on the early identification of struggling children while continuing to meet their physical needs. Such a shift is important, as these facilities, which are now generally considered early childhood care and education (ECCE) centers, assume the responsibility of making certain that young children develop the prerequisite behaviors and skills necessary in fostering later scholastic achievement.

Research (e.g., Davies & Brember, 1997; Molfese, Modglin & Dennis, 2003; Schweinhart, Weikart, & Larner, 1986) has and continues to support the importance of ECCE programs and the conclusion that children who attend high quality programs benefit in numerous ways, enjoying greater gains and attainment across educational domains when compared to their lower quality ECCE center counterparts. However, it remains concerning that despite an increased national focus on early childhood education, and a wealth of empirical data supporting the validity of high quality programs, great disparities remain in the immediate and long-term outcomes of participating children.



This point was recently made clear in the first year findings of the Head Start Impact Study. Results indicated that participation in Head Start programming had some positive effect on the prewriting and prereading skills of children through first grade, but had no significant effect on the student's oral comprehension, phonological awareness or early math skills (Munsey, 2006). In light of these results, one must wonder what other facets of early educational development and of the ECCE environment itself must be communicated, taught and refined in order to ensure school readiness and scholastic success among young children.

Another issue tied to the disparity in the scholastic outcomes of ECCE participants is that of assessment and intervention. While research has provided a foundation from which to conclude that high quality ECCE programming can have a significant impact upon the scholastic outcomes of children, and in turn potentially serve to thwart the development of academic difficulties, it is concerning that little emphasis has been placed on revising the outdated methods of assessment and remediation. Struggling children continue to be subjected to conventional norm-referenced assessments of cognitive functioning that are based greatly upon theoretical inference of neurological processes that are "to the detriment of young children" (Neisworth & Bagnato, 2004, p. 199). Furthermore, these norm-referenced assessments of intellect do not provide a complete and practical description of a child's progress and fail to inform early childhood educators as to areas of needed development. Moreover, inference into a young child's cognitive functioning, by way of an intelligence test or other standardized means, fails to provide information necessary for the identification and correction of less than adequately developed skill sets essential to success in later academics as the

construct lacks “finality in the explanation of learning differences” (Stott, Green, & Francis, 1983, p. 61). Considering this, it may be necessary to focus on additional variables to explain the learning differences of children, to guide interventions and guarantee that children enter school ready to learn. Through such an alternate focus, advances may be made in the education and care of young children that will further serve to bolster educational success.

A 1997 report by the National Education Goals Panel (NEGP) indicated that in order for young children to be successful in school, they must enter with development in five essential areas: physical well-being, social and emotional development, language development, cognition and general knowledge, and approaches to learning. Of these five, the approaches to learning element is touted to potentially be the most essential as it reflects early behaviors important to young children’s ability to become engaged in and exploit classroom learning opportunities (Fantuzzo, Perry & McDermott, 2004). However, this element remains one of the least researched and least understood (Kagan, Moore, & Bredekamp, 1995). A relevant body of literature has demonstrated that the inclusion of learning behaviors contribute to the prediction of scholastic achievement to a higher degree than intelligence test scores alone (McDermott, 1984; McDermott & Beitman, 1984). Literature has also demonstrated that positive learning behaviors are linked to decreased levels of psychopathology and academic failure among youth (Fantuzzo et al.), as well as serve to reduce children’s risk for developing learning disabilities (McDermott, Goldberg, Watkins, Stanley, & Glutting, 2006). However, extremely little is known about the formation and importance of preschool learning behaviors. Such a lack of empirical evidence is concerning as the ECCE experience,

during which the formative approaches to learning are presumably introduced and reinforced, serves as a pivotal factor which directly impacts the future academic attainments of young children (Davies & Brember, 1997). The importance of these approaches are reinforced when additional circumstances that place children at a greater risk for future academic failure; including sociodemographic factors associated with poverty, familial discord, parental absence, and low socioeconomic status; are considered (Fantuzzo et al.).

### Significance of the Problem

Despite promising empirical evidence supporting the educational benefits of early childhood environments and the proposition made by the NEGP related to components essential for early school success, a remarkably limited number of studies have been conducted to examine the relationship between these variables. Those studies that have been conducted have produced results emphasizing the importance of educational environments fostering learning behaviors in school-aged children and how these factors directly contribute to overall education (McDermott, Leigh, Perry, 2002). For example, Fantuzzo and colleagues (2004) have purported that approaches to learning, or the discrete behavior sets that allow for a student's classroom engagement, are directly linked to overall academic success and serve as the cornerstone which encompasses all education. However, no studies have fully investigated or attempted to generalize school-aged findings to the preschool population, explain the manner in which these approaches to learning vary based on ECCE center quality, or evaluate the potential of preschool learning behaviors and their resulting influence on early scholastic achievement across core educational domains.

Thus, the significance of this study was to gain an increased level of understanding into the formation of preschool learning behaviors, their association with ECCE center quality, and early childhood achievement across core preschool curriculum areas. Such information, while being the first of its kind in extant literature, would potentially provide a means through which early childhood programs could be enhanced to increase children's level of school readiness and from which additional research may be conducted. This line of inquiry could have ultimately served as a vehicle to improve the overall quality of ECCE programs as the quality program factors related to the enhancement of preschool learning behaviors could be targeted and altered to promote scholastic success among all children. This is particularly applicable to those children that are at a greater risk for future academic failure. By investigating the associations between preschool learning behaviors, early learning outcomes, and classroom practices, it was believed that early childhood professionals could be provided with the information necessary to recognize those children who are struggling in the development of learning behaviors. Further, it was felt that professionals could be provided with the requisite tools necessary to promote positive learning behaviors, and consequently impact early academic achievement. Finally, by gaining an understanding of which ECCE practices promote positive learning behaviors, the greatest impact could be made among low-income children, who confront many educational risks.

### Theoretical Basis

#### *Learning Behavior*

The behaviors aligned with a child's course of learning in the context of school have been deemed learning behaviors. Learning behavior may be defined as "the distinct

way in which a child characteristically goes about the learning process” (McDermott & Beitman, 1984, p. 6). Such learning styles include those behaviors that are observable and inclusive of “problem-solving strategies, decision-making behaviors, and the child’s reactions to the expectations and limitations of school learning situations” (McDermott & Beitman, p. 6). Considering the definition provided by the constructs’ proponents, the most appropriate theoretical basis underlying learning behavior, is behavior theory. In its simplest form, behaviorism, as it applies to learning, bases learning on observable occurrences and makes no attempt to account for unobservable mental events (Ormrod, 1999). As coined by Watson in the early 20<sup>th</sup> century, behaviorism is based in the scientific inquiry of observable events that may be objectively accounted for and attributed to modifications in the external environment (Ormrod; Mazur, 2002). While the precise processes that may be attributed to learning have been issues of contention among behaviorists over the past century, basic assumptions appear to permeate all behavioristic explanations and are pertinent in the conceptualization of learning behavior.

The first assumption of behaviorism is that an individual’s mental processes should be excluded from scientific study as they cannot be objectively measured (Ormrod, 1999), but rather require one to postulate as to their occurrence, thus compromising the ability to accurately explain the manner in which learning occurs. Rather, emphasis should be placed on the phenomenologically based occurrences of the environment. This theoretical undertone is essential to the conceptualization of learning behaviors as it has been proposed that learning behavior may be observed, and altered if shown to be counterproductive to successful learning. Such recognition of faulty learning behavior does not hinge upon inference as to the cognitive processing of a child, or the

quality of such processing for that matter, nor as to his or her emotional state, but rather upon those observable behavioral iterations that occur in response to the educational circumstances put forth in the learning environment.

Second, behaviorism is grounded in the assumption that in order for an individual to learn, his or her behavior must change (Ormrod, 1999). While the requirement of behavioral change is not explicit in the proposition of learning behavior, as learning behavior is not the process of learning as it has been defined by methodological behaviorists, but rather the manner in which a child proceeds in the learning process, a relative association may be made. Specifically, children, by way of interaction with their educational environment, may have developed positive learning behaviors which require continued exposure to positive educational circumstances in order to be maintained. As such, behavioral change would have occurred at some point in the learning process, particularly at the time when learning behavior development took place. Alternately, children who have developed poor learning behaviors may experience great behavioral change as their individual learning behaviors are modified through instructional practices. As a result of practices that foster positive learning behavior development, student's behavior may be observed as differing greatly from prior responses to stimuli presented in the educational context.

Third, behaviorists have long posited that the events that occur in a person's environment serve as the primary determinants of their actions and are the main forces that stimulate learning (Ormrod, 1999; Schwartz, 1978). As such, an individual is conditioned by the events that take place in his or her surroundings, and these alterations in environmental circumstances are those that result in personal change and learning. The

construct of learning behavior is that which is taught and modified through interaction with environmental circumstances that are geared toward the refinement of positive learning behavior. Thus, the manner in which an educational environment is established and maintained will have a tremendous impact upon the formation of these behaviors, with poor behaviors resulting from environmental conditions that fail to foster behaviors among the domains of Competence Motivation, Attention/Persistence, Strategy/ Flexibility, and Attitude Toward Learning.

A final point underlying the behavioral basis from which learning behavior may be conceptualized is the stimulus-response association. In its most primitive form, stimuli may be considered as the events in one's environment that elicit a response (Ormrod, 1999). Generally, such stimuli and the subsequent responses are evaluated with regards to their association to one another, and provide a means through which psychologists are able to study learning and behavior objectively, negating the necessity of inferring as to a person's mental processes. Such an association, even in the simplest of explanations, may be determined to be linked with the learning behavior construct as learning behavior identification, evaluation, and alteration, are based on the premise of observing a child's reaction to limits and expectancies placed on them by the educational environment. As such, a child's educational surroundings, inclusive of the curricular activities utilized and the general behavioral expectancies of the environment, may be thought of as the stimuli present in the environment. Resulting from this is the child's response, which assumes the form of learning behavior.

As reviewed previously, learning behavior conceptualization can be most closely aligned with behavioral theory, considering the explanation provided by the proponents

of learning behavior and based on the assertions that such behaviors may be observed, taught and altered, as well as being independent from inference into one's underlying cognitive processes. Despite such a theoretical alignment, it is undeniable that one's cognitive processes play a tremendous role in the manifestation of such behavioral displays. Considering this, a review of two assumptions underlying cognitive theory, which most closely align with learning behavior, is pertinent. First, unlike behaviorism, cognitive theory asserts that the mental processes that underlie one's actions must be the primary focal point of scientific inquiry (Ormrod, 1999). Through an examination of these processes, it is possible to unearth which influence one's behavior. As such, learning behaviors may be conceptualized as the result of innate cognitive processes that serve to promote adaptive or maladaptive learning behavior that assist or impede upon a child's success in the educational context. This second assumption, which reflects the belief that an examination of the observable behavior one displays allows for inferences into the cognitive processes that direct behavior, is highly applicable to learning behavior conceptualization, although more pertinent to their measurement. More specifically, in assessing the behavioral tendencies of a child while he or she engages in the learning process, it is possible to note those behaviors, as outlined by the proponents as essential to academic success, which are beneficial as well as counterproductive. As such, inferences can be made into the cognitive processes that support such behavioral displays.

While the theoretical basis for learning behaviors most closely aligns with behaviorism and cognitivism, it must be noted that the scholars who have put forth the most recent means of conceptualizing and measuring these behavioral responses do not



draw from one particular heuristic theory nor utilize a specific theoretical orientation from which to base the concept. More specifically, the learning behavior concept, and subsequent individual learning behaviors, are drawn primarily from empirical evidence supporting the validity of the construct and warranting it as a vital component in understanding differences in scholastic success, as well as a potential means through which poor educational achievement may be improved.

#### *Early Childhood Care and Education Program Quality*

Historically, the construct of early childhood program quality has been dynamic as each respective program, whether it be a preschool or daycare center, has conceptualized and defined the construct differently. To guide the field in the conceptualization of quality programming, the National Association for the Education of Young Children (NAEYC), established guidelines for Developmentally Appropriate Practices (DAP) from which those working with children between birth and age 8 may understand developmental expectations, engage in practices that are considered appropriate for particular cohorts, and to conceptualize factors of programmatic quality. Largely, ECCE programs' educational practices are grounded in the constructivist perspective of Piaget's leveled, cognitive-developmental theory (National Research Council, 2001), yet informed by the sociocultural perspectives of child development put forth by Vygotsky (Bredekamp & Copple, 1997).

Piaget's cognitive-development theory is based on the premise that children's ability increases through the edifice of cognitive structures by way of seeking, selecting, interpreting and ultimately reorganizing information obtained through environmental interaction (Zimbardo, Weber, & Johnson, 2000). Under this theoretical paradigm,

children are viewed as proactive agents in their learning as they initiate encounters with the environment in order to gain knowledge (Green & Piel, 2002). According to Piaget, this acquisition of knowledge, the resulting development of children's thoughts, and the effective use of this increased mental ability is not possible until information is organized effectively and adjusted to accommodate new environmental input (Green & Piel; Zimbardo et al.). This increased mental efficiency is the result of maturation and active participation with environmental conditions that meet a child's given level of mental ability. As such, Piaget proposed four innovative stages of cognitive development that are attuned with children's cognitive growth (Zimbardo et al.). Children progress through these stages in a common and invariant manner with distinctive thoughts emerging in each phase. The second of Piaget's stages, the preoperational stage, encompasses children in early childhood and is characterized by increased advances in the mental representation of objects, their refinement of figurative knowledge, as well as a continued void in purely logical thought (Green & Piel; Zimbardo et al.). In addition to these tendencies of preoperational children, Piaget attested to other cognitive limitations present in this phase of development, inclusive of egocentrism, animistic thought and centration. As a result of the comprehensiveness of this theoretical position in informing the cognitive advances of children, DAP were formed by NAEYC which embody the developmental limitations of young children by imposing age limitations on such practices (see Bredekamp & Copple, 1997). Also, DAP serve to guide quality programmatic construction in a manner that embraces child exploration, independence and variety in activities, with minimal teacher interference (National Research Council, 2001), so to promote greater cognitive development. In sum, children are provided with

environmental circumstances that meet their developmental level, as proposed by Piaget, and serve to forge the advancement of mental representation, figurative knowledge and the organization of the cognitive structure through purposeful interaction with the environment.

While Piaget's constructivist approach has provided the greatest influence on the developmentally appropriate education of preschool aged children (National Research Council, 2001), the importance of the Vygotskyian principles of language, societal influence and zone of proximal development have also served to inform the manner in which early childhood education is conceptualized and how quality ECCE programs are formulated (Bredekamp & Copple, 1997). According to Vygotsky, through a child's development of language, he or she is able to utilize private speech to guide actions and direct individual learning (Berk, 2003). Considering this, Vygotsky regarded the expansion of language as the cornerstone of child development and the basis from which more advanced cognitive processes may occur (Berk). Under the sociocultural perspective, language and private speech play tremendous roles in cognitive development as these skills allow children to engage others socially. By way of engaging in activities and dialogue with peers, as well as activities with mature learning assistants, children refine their linguistic capacity, and that of their private speech, which in turn results in the refinement of cognitive processes (Berk). Moreover, when social interactions with more cognitively advanced individuals occur, the child's zone of proximal development is enlarged and tremendous cognitive gains will ensue (Berk). ECCE programs that are based on the concepts of DAP, dually embrace Vygotsky's propositions of cognitive development. This is reflected in the incorporation of increased language expectations for

the preschool cohort, along with the activities that embrace socialization, reasoning, and imaginative play, as well as those which require the assistance of others (Bredekamp & Copple).

### Relevant Literature

#### *Learning Behavior*

Since the initial examination of learning styles or behaviors, researchers have demonstrated that positive learning styles or behaviors among school-aged children are associated with greater levels of academic success. Results of longitudinal research conducted by Stott and colleagues (1983) demonstrated that among a large sample of British students, those who were rated by their educators as possessing positive learning behaviors during the first year of the study demonstrated greater success in reading, mathematics and spoken language when assessed during the second year. A follow-up study with the same children provides additional support for the importance of learning behaviors in relation to educational achievement. Analysis of school attainment data following a four-year period concluded that moderate levels of constancy among learning styles remained, and that moderate correlations existed between learning behaviors and scholastic attainment as measured by both educator ratings and standardized achievement results (Green & Francis, 1988). McDermott & Beitman (1984) found similar results among kindergarten students, noting that when achievement levels were evaluated 15 months after learning behavior assessment, significant correlations were found between learning behavior and first grade achievement ratings across the curricular areas of reading, writing, spoken language, mathematics and general conduct. Additional results supporting the relative importance of learning behaviors in the attainment of scholastic

success were produced in a study that examined teacher ratings and standardized academic achievement results in the curricular areas of reading, mathematics, spelling, and language, following a two year period (Birrell, Phillips, & Stott, 1985). These results indicated strong associations between learning behaviors and later scholastic success across academic domains, citing correlation coefficients stronger than some proposed between intelligence and academic achievement (Birrell et al.).

Results of the national standardization of the 29-item Learning Behaviors Scale (LBS), which was completed on 1,500 noninstitutionalized children between the ages of 5 and 17, provide additional support for the validity of learning behaviors, their importance in the educational context, and as a standardized vehicle for assessing children across social strata (McDermott, 1999). This national LBS standardization study yielded four factor derived learning behavior dimensions, confirmed the applicability of the measure across the sample, confirmed the validity of the measure, and demonstrated that the learning behaviors accounted for a great amount of incremental predictive validity with regards to future achievement, above and beyond intelligence (McDermott). A study conducted by Schaefer and McDermott (1999) further enunciates the importance of learning behavior as related to scholastic achievement. Results of data generated from a sample stratified in accordance with the U.S. Census demonstrated that intelligence and learning behaviors were independent constructs, indicating that learning behaviors were in fact unique and as such require independent consideration in their effect on the learning process (Schaefer & McDermott). Furthermore, analysis of learning behaviors, intelligence, teacher reported grades, and standardized achievement results indicated that learning behaviors explained a larger amount of the variance for educator assigned

grades, while intelligence accounted for appreciable variation of standardized achievement test scores (Schaefer & McDermott). In light of these results, it may be concluded that learning behaviors are indicative of the actual learning processes that occur in the classroom, as reported on by a child's educator. A final result, which was duplicated in a study later conducted by Yen, Konold, & McDermott (2004) indicated that when utilized in concert, intelligence and learning behaviors accounted for a greater portion of the variability in standardized achievement results and educator assigned grades, than either of the constructs did independently (Schaefer & McDermott).

The extant learning behavior literature has been inclusive of samples of children enrolled in formal schooling that were within the preschool age range (e.g., 3 to 5 ½ years old). This literature (Green & Francis, 1988; McDermott, 1984; McDermott & Beitman, 1984; Stott et al., 1983) has demonstrated that the learning behaviors exhibited by this cohort are no less essential to the development of academic skill sets than are the learning behaviors of older school-aged children. As such, it has been concluded that early learning behaviors “play a fundamental role in the development of academic readiness skills” (McDermott et al., 2002, p. 354). Moreover, it may be concluded that if early learning behaviors are evident among the preschool cohort, preventative measures may be taken to thwart future academic failure and promote adequate basic skill development. To this end, McDermott and colleagues (2002) developed and standardized the Preschool Learning Behaviors Scale (PLBS) for the purpose of delineating and assessing early learning behaviors within the confines of ECCE programs, which generally lack the environmental structure and demands found in formal school programming. Results of the national PLBS standardization indicated that 29 learning behaviors, which closely

resembled those found on the school-aged LBS, were reliable, valid, and loaded among the three learning behavior dimensions of Competence Motivation, Attention/Persistence, and Attitude Toward Learning (McDermott et al., 2002). Also, results demonstrated that preschool learning behaviors were in fact independent of cognitive ability and that positive preschool learning behaviors were associated with positive social skills and overall prosocial behaviors, while poor preschool learning behaviors correlated highly with problem behavior (McDermott et al., 2002). These results were replicated in a later study, which confirmed the validity of the three PLBS dimensions and demonstrated that learning behaviors were associated with behaviors conducive to success in early educational environments (Fantuzzo et al., 2004).

The promise of these results lie in the fact that the PLBS and the component behaviors may provide a means to evaluate a child's readiness to succeed academically and personally, as well as potentially serve as a means to identify and thwart future scholastic failure. Furthermore, such a system for evaluating preschool learning behaviors provides an alternative that may revitalize the preschool screening, assessment, and progress monitoring processes as standardized measures have been lacking in that they fail to be inclusive of a child's authentic behaviors (Neisworth & Bagnato, 2004).

#### *Early Childhood Care and Education Program Quality*

Quality ECCE centers have been shown to have a tremendous impact on child outcomes (Herrera, Mathiesen, Merino & Recart, 2005), serving to affect children's performance across a number of academic and social domains. In a 1995 review of 36 studies focused on the effects of various early childhood programming models (e.g., preschools, Head Start, child care, home visiting programs), Barnett (1995)

concluded that quality early childhood programming “can produce large short-term benefits for children on intelligence quotient (IQ) and sizable long-term effects on school achievement, grade retention, placement in special education, and social adjustment” (p. 25). According to the National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network (1998), the quality of an ECCE program is the foremost predictor of a child’s behavior. High ECCE program quality has been linked to higher levels of language, quantitative, cognitive, and social skills among children, as well as fewer behavioral problems and better social-emotional development (Marshall, 2004; NICHD Early Child Care Research Network, 2006; Peisner-Feinberg & Burchinal, 1997; Votruba-Drazal, Coley, & Chase-Lansdale, 2004). However, when comparing children from various sociodemographic backgrounds, those from lower socioeconomic groups appear to make the greatest gains (Scarr, 1997, 1998). High quality ECCE programs have also been shown to promote greater levels of positive adaptive behavior skills among children experiencing major developmental delays (Booth & Kelly, 2002). The extant literature further indicates that ECCE educators who are highly trained and responsive to children’s emotional needs, a factor of ECCE process quality, have been shown to contribute to a child’s development of “emotionally competent behaviors throughout life” (Ashiabi, 2000). As such, high quality ECCE programs may be thought of as the antecedent to a child’s development of school readiness skills (Fontaine, Torre, & Grawallner, 2006) as all of the aforementioned areas of development are essential to a child’s readiness to learn and succeed in formal education. Results of a study conducted by Gormley, Grayer, Phillips and Dawson (2005) on the school readiness of children who participated in a universal quality pre-kindergarten program indicated that all children,



despite racial differences, demonstrated significant gains across academic areas and that the program “succeeded in enhancing the school readiness of a diverse group of children” (p. 872). The importance of such programs is not, however, noticed only in gains made during these formative years or up until the point of school entry, but also in the carryover effects noticed well into formal aged schooling and beyond.

Results of a number of studies (e.g., Johnson & Walker, 1991; Sheehan, Cryan, Wiechel, & Bandy, 1991) suggest that children’s participation in high-quality ECCE intervention programs have profound effects on initial formal school-aged academic success, with a few programs demonstrating that such effects may last well into later life (e.g., Campbell, Pungello, Miller-Johnson, Burchinal & Ramey, 2001). For example, results of the Abecedarian Project, a longitudinal study on the effects of quality child-care on low-income children, indicated that quality and intensive ECCE program participation had long-term effects on participants’ cognitive growth and academic development (Campbell et al.). Analysis of ECCE center treatment and control group results indicated that children exposed to intensive ECCE programming demonstrated higher scores on measures of cognitive skill through the age of 15, as well as on measures of academic skill in the areas of reading and mathematics, through age 21, with “preschool cognitive gains accounting for a substantial portion of treatment differences in the development of reading and math skills” (Campbell et al., p. 231).

Other studies have yielded similar results. Broberg, Wessels, Lamb & Hwang (1997) found that children exposed to quality out-of-home care during the preschool years demonstrated higher levels of verbal and mathematical ability in second grade than those exposed to home-based care. Ramey & Ramey (2004) found that quality preschool

educational programming focused on variety and quality of experience had profound effects on improving the school readiness and long-term academic success of at-risk children through secondary school. Moreover, findings demonstrated that high-quality ECCE programming resulted in decreased levels of special education enrollment as well as fewer grade retentions (Ramey & Ramey). Campbell and Ramey (1995) reported that at-risk African American adolescents who participated in quality early childhood programs scored significantly higher on individually administered tests of reading and mathematics achievement, were retained less, and had fewer instances of enrollment in special education programming through the age of 15.

#### Problem Statement

The assertion that quality ECCE programs have a significant impact on participating children and provide opportunities for the development of school readiness skills is well established. However, the extant literature has just begun to report on the importance of preschool learning behaviors and their potential impact on school readiness. No empirical evidence exists which evaluates the quality components of ECCE classrooms that may aide in or impede upon preschool learning behavior formation. Moreover, no information related to the relationship of preschool learning behaviors, early childhood classroom quality and the curricular attainments of young children is available in the literature to date. The purpose of this study was to evaluate the relationship between ECCE program quality and preschool learning behaviors. Further, this study investigated the discrete components of programmatic quality and their relationships to preschool learning behaviors. This study also evaluated the potential relationship between child attainment in the preschool curriculum and preschool learning

behaviors. Finally, the potential for interconnectedness among preschool learning behaviors, programmatic quality and academic achievement was explored.

### Research Questions and Hypotheses

This study investigated the relationship between preschool learning behaviors, ECCE center quality, and early academic achievement among the preschool aged cohort (4 years to 5 years, 11 months). Specifically, this study examined the following research questions:

- i. Research Question 1: Do the items of the Preschool Learning Behavior Scale (PLBS) yield robust dimensions of learning behavior for this sample?
- ii. Hypothesis: PLBS items will load among the three distinct preschool learning behavior dimensions of Competence Motivation, Attention/Persistence, and Attitude Toward Learning.
- iii. Research Question 2: Are the three dimensions of preschool learning behavior validated by other measures?
- iv. Hypothesis: Each of the preschool learning behavior dimensions will be validated by other measures identified to evaluate similar competencies.
- v. Research Question 3: Do children who experience different levels of overall early childhood classroom quality significantly differ in overall preschool learning behavior?
- vi. Hypothesis: Children from different quality programs will demonstrate statistically significant overall preschool learning behavior differences, with children from higher quality programs demonstrating significantly

stronger positive preschool learning behaviors than children from lower quality programs.

- vii. Research Question 4: Do children who experience different levels of ECCE quality significantly differ across the three preschool learning behavior dimensions of Competence Motivation, Attention/Persistence, and Attitude Toward Learning?
- viii. Hypothesis: Children from different quality programs will demonstrate statistically significant differences across each of the three preschool learning behavior dimensions, with children from higher quality ECCE programs demonstrating significantly stronger preschool learning behaviors across each dimension than children exposed to lower quality ECCE environments.
- ix. Research Question 5: Which of the 16 ECCE quality factors identified by Cassidy and colleagues (2005) are predictive of overall preschool learning behavior?
- x. Hypothesis: The ECERS-R subscales items aligned with developmentally appropriate instruction and learning practices (i.e., Language-Reasoning, Activities, Interactions and Program Structure) will be the greatest predictors of overall preschool learning behavior.
- xi. Research Question 6: Do children who experience different levels of overall early childhood classroom quality significantly differ in early academic skills?

- xii. Hypothesis: Statistically significant differences in overall early academic achievement will emerge between children participating in high, medium, and low quality early educational environments.
- xiii. Research Question 7: Do children who experience different levels of overall early childhood classroom quality significantly differ across each of the four areas of early academic skills?
- xiv. Hypothesis: Statistically significant differences in early academic achievement will emerge across each of the four achievement areas, with those children experiencing higher preschool quality demonstrating stronger achievement across each academic domain when compared to their medium and low ECCE quality counterparts.
- xv. Research Question 8: Is the effect of ECCE program quality on early academic skill level mediated by preschool learning behavior?
- xvi. Hypothesis 1: Learning behavior will have a mediating effect such that the relationship between program quality and early academic skills will be reduced by the impact of preschool learning behavior.

## CHAPTER II

### LITERATURE REVIEW

#### Historical Background

##### *Learning Behavior*

Educational systems worldwide have commonly adopted the position that children's current as well as future educational success is best and most accurately forecasted by cognitive ability or intelligence. As a result, the hypothetical construct of general intelligence has assumed a prominent position in the advancement of educational theory and practice (McDermott, 1984), and is the driving force behind the majority of educational decisions. For example, children with general intelligence below a standard score of 70, while in concert with adaptive skill deficits, are considered Mentally Retarded (U.S. Congress, 2004) and entitled special education services under law. Intelligence also has and continues to be utilized by theorists, social scientists, and educators as a marker of a child's expected educational achievement and used as a point of comparison for evidenced achievement in order to determine if a significant discrepancy exists between constructs to identify a learning disability (U.S. Congress).

Despite the significance placed on one's IQ score, the concept of intelligence continues to be one of the most controversial topics in education and the social sciences. "Many researchers remain skeptical about the nature and developmental course of general intelligence and the meaning attached to the IQ score, in particular, as an indicator of general intelligence" (Ceci, 1991, p. 703). Further, a child's IQ score fails to provide information necessary in the identification and correction of less than adequately developed skill sets necessary for success in later academics (Stott et al., 1983). In light

of such conclusions, systems of subtest analysis have been proposed and touted as providing more precise information that is anomalous, pertinent, and meaningful (McDermott & Glutting, 1997) above and beyond that which is accounted for by general intelligence. Nevertheless, such detailed systems have met significant challenges and have been criticized for failing to yield all information necessary in predicting current and future achievement (McDermott, Fantuzzo, Glutting, Watkins & Baggaley, 1992). This concern has led some scientists to conclude that evidence for these methods of identification are not representative of children's functioning, nor are effective in distinguishing students who are underachieving from those with adequate achievement levels (Hale, 1979). As a result, evaluative methods that account for the functional differences of children, and extend beyond intellectual inference in accounting for attainment discrepancies, and which may serve to thwart later personal and academic problems, have been proposed.

*Foundational history of learning behavior.* Intelligence, as measured by the IQ score, fails to prove useful in thwarting the future academic inadequacy predicted, fails to provide a copious description of how a child learns best (McDermott, 1984; Stott, 1985), and fails to inform educational personnel as to a child's unique learning style and how this style is differentiated from that of his or her peers (McDermott, 1984). Considering these propositions, researchers have long proposed alternative explanations for learning success and failure (e.g., Dweck, 1975; White, 1959) and have advocated for the use of alternative assessment measures (e.g., Engelman, Granzin, & Severson, 1979; Guerney, 1979; Keogh & Becker, 1973). These advocates have campaigned for the administration of alternate assessments prior to and during school enrollment. Some of these alternate

methods focused on the observable styles and behaviors aligned with and which impact learning. It was believed that these alternate methods may inform instructional methodology to enhance educational achievement, and guide intervention strategies aligned with individual student traits or dispositions (McDermott, 1984).

For decades, researchers have hypothesized and identified numerous factors that may be considered responsible for influencing children's learning. Two such factors are motivation and attributional style. White (1959) provided a reconceptualization of motivation, abandoning the predominant drive-reduction and psychoanalytic instinct theories of time, in light of the belief that human behavior could not simply be explained as being operated by drives. He contended that in humans, the "directedness and persistence" of the behaviors essential in learning was best accounted for by competence that had a "motivational aspect," whereby "the motivation needed to attain competence [could not] be wholly derived from sources of energy conceptualized as drives or instincts" (White, p. 297). Rather, one's competence was formed through interactions with the environment that resulted in self-efficacy. Self-efficacy, or what White termed "effectance motivation," provided an individual with satisfaction from interacting with and manipulating his or her environment, and is the force that leads to continued and persistent interactions that result in human learning (White, p. 329). White concluded, that an individual's desire to learn stemmed from an innate need to adapt to one's environment and these ongoing transactional processes served to motivate the individual to explore, manipulate, conceive and ultimately learn.

The concept of attributional style has also been proposed as having a potential effect on the learning of children. Dweck (1975) sought to determine whether changes



made in children's attributions for failure significantly impacted their future coping with disappointment. In this study, 12 'helpless children' with extreme reactions to failure were identified and placed in one of two treatment groups: success only treatment or attribution retraining treatment; and were evaluated on a number of measures (Dweck). Results indicated that by altering children's attributional style, children were more likely to maintain and improve performance, as well as persist in difficult activities. Further, it was determined that children receiving the attribution retraining assumed a greater level of internal locus of control than their 'helpless' peers. This was achieved as those who underwent the retraining assumed a personal responsibility for their failures and explained that such failures were the result of low levels of personal effort (Dweck). Guerney (1979) advocated for affective assessment and for the treatment of preschoolers through an educational skill-training model. The goal was to promote related mental health skills that would serve to thwart later personal problems, and subsequent academic problems. He extended this proposition to school-aged children, citing that the benefits of direct, affective skill training among children, who were liable to develop affective difficulties, would be colossal (Guerney). While these alternate explanations are worthwhile in attempting to account for the variation in children's learning, they too are relatively hypothetical constructs that require great inference into underlying psychological processes. Moreover, each explanation of variability in student learning and the ways through which to potentially improve competence cannot be accurately evaluated or explained through valid and reliable measures (Schaefer & McDermott, 1999).

Other researchers, focused primarily on the constructs that were present in a child's external world. Engelman and colleagues (1979) advocated for assessment strategies that focused on variables outside of the student. Such strategies centered on the manner and quality of the instruction delivered to the learner, as well as the manner in which the student learned. They contended that only by knowing how these variables interacted with one another and the child could a diagnostician make a proper determination for appropriate remediation (Engelman et al.). Keogh and Becker (1973) similarly argued in support of assessment procedures that extended beyond intelligence alone, and in favor of interventions that were informed by more than quantified test instruments. They advocated for assessment procedures that embodied "a process oriented behavioral approach to evaluation" (Keogh & Becker, p. 9). Such a process was inclusive of observing children's classroom behavior and determining the manner in which the child approached educational activities, his or her attentional capacity, level of persistence toward given tasks, as well as his or her employment of problem solving strategies (Keogh & Becker). As conceptualized, this approach would not merely serve to predict the likelihood of learning failure, nor simply confirm a learning disability hypothesis, but rather serve to inform and guide the development of intervening strategies to prevent such failure.

Considering the questionability of intelligence measures as a method utilized in predicting a young child's academic promise, personal strengths and weaknesses, as well as aptitude, as discussed previously, and in light of a call from social scientists for the acceptance of an increasingly global conceptualization of the factors impacting student learning and the evaluation of these factors, it was necessary to investigate additional

methods. More specifically, it was required that “phenomenologically oriented skills that actually define success in the school learning process” be examined (McDermott, 1984, p. 39). It was also necessary to define those skills that availed themselves to providing information relative to the creation or adaptation of instructional programming that serves to strengthen or remedy deficiencies evidenced by the child (McDermott, 1984). Further, it was imperative that evaluative methods be devised that could account for such observable constructs. Through the culmination of the research conducted, it has been proposed that such skills, which may be as important to the developing child as intelligence in fostering learning (Dembo, 1977) and educational achievement, are learning styles or behaviors that allow for and promote educational accomplishment. Learning behaviors may be defined as keystone behaviors that are pivotal to school success (Barnett, Bauer, Ehrhardt, Lentz, & Stollar, 1996). Their importance rests on the proposition that they may be observed, taught and altered (DiPerna & Elliott, 2002; McDermott, 1984; McDermott & Beitman, 1984; Schaefer & McDermott, 1999) and lend themselves to improvements that are evidenced in educational success, social adjustment and potentially even cognitive ability (Brown & Campione, 1982; Ceci, 1991). Such learning behaviors are synonymous with a child’s learning style, which is comprised of a set of processes that include observable strategies, decision making behaviors, as well as reactions to the boundaries of the educational environment (McDermott & Beitman, 1984).

Unfortunately, an extremely limited amount of research has been conducted in this domain. However, that which has been conducted is consistently supportive of learning style or behavior as essential to overall early and later child learning and

outcomes. Such findings have been supportive to an extent commensurate with many of the intellectual measures thought to be most significant in successful educational development, achievement and intervention. Such support stems from the belief that rather than the need to rely on abstract methods of evaluation resulting in inferential remedial strategies that may be mediated by a number of factors, assessment of how a child is likely to perform academically may be best achieved by focusing on “unique patterns of learning-related behavior manifested by children as they actually go about learning in the school context” (McDermott & Beitman, 1984, p. 6).

The behaviors aligned with a child’s course of learning in the context of school have been deemed learning styles. Learning style may be defined as “the distinct way in which a child characteristically goes about the learning process” (McDermott & Beitman, 1984, p. 6). Such learning styles include those behaviors that are observable and inclusive of “problem-solving strategies, decision-making behaviors, and the child’s reactions to the expectations and limitations of school learning situations” (McDermott & Beitman, p. 6). The research previously reviewed has provided a strong basis for the necessity of examining additional factors that many influence academic success. Additional research, conducted predominantly in the 1980’s, provides a strong foundation for the conceptualization of precisely what constitutes learning style or behavior. These studies, which are reviewed later in this discourse, also establish the basis from which the most recently validated constructs of learning behaviors or styles are conceptualized.

#### *Early Childhood Care and Education Program Quality*

The first five years of a child’s life are vital to future development. It is during this developmental period that tremendous growth occurs, and is a time when the

importance of supportive environments that advance development across cognitive, social, emotional and motor domains cannot be stressed enough (National Research Council, 2001). While this may be considered the common view of professionals today, the historical roots of early childhood programming diverge significantly, being reflective of the social and economic differences that have not only served to divide the societal structure of this nation, but also that of children's education.

*History of ECCE programs and quality.* Early in the 19<sup>th</sup> century, early childhood programming evolved from harsh knitting schools into infant schools. These infant programs focused on education and development as it was recognized that the poor living and working conditions of young European children was to their detriment (Spodek, 1973; Spodek & Brown, 1993). The overarching goal of these programs was to advance society, through the education and care of young children (Spodek & Brown).

While such a belief spawned the creation of similar schools in the United States, their existence was brief, citing public school officials' firm stance against early childhood education (Spodek & Brown, 1993), a belief that lasted until the early 20<sup>th</sup> century. This position on early education was not simply a belief held in specific localities, but rather it was our nation's stance on early childhood education and the position that the most appropriate place for young children was with their mothers (Vinovskis, 2005). At the first White House Conference on Children held in 1909, our nation declared that one's home life was "the finest product of civilization. Children should not be deprived of it except for urgent and compelling reasons. Except in unusual circumstances, the home should not be broken for reasons of poverty" (U.S. Department of Health, Education, and Welfare, and Rehabilitation Service, 1967, p. 4). Such a

proclamation not only dispelled the notion of educating young children, but did so with full recognition of the challenges faced by those battling the plight of poverty.

Ironically, it was during this same period that the child study movement was established. This movement placed an increased emphasis on conceptualizing and understanding the manner in which children develop and learn (Spodek & Brown, 1993) and is that which propelled the international expansion of early childhood education and care. Directly taken from this movement was the creation of Italian Montessori schools. These institutions focused on the training of children's senses through engagement in activities and the manipulation of materials that allowed for self-correction with minimal educator interference (Spodek, 1973; Spodek & Brown). Children participating in Montessori programs learned self-care and received instruction across a number of academic areas (Spodek & Brown). Programmatic focus was placed on the provision and manipulation of a fluid early childhood environment that allowed for increased refinement of skills as children progressed through various developmental stages (Spodek & Brown).

This advancement in the conceptualization of early childhood and the environments that were most conducive to and aligned with the knowledge of child development at the time, led to the development of British nursery schools in the early 20<sup>th</sup> century. These programs, as conceptualized by Margaret McMillan, would make significant differences in the lives of impoverished children so long as they did not focus solely on the medical treatment and physical needs of youth, but also if they mimicked the educational programming, structure and composition of the nursery programs afforded to wealthy children (Spodek & Brown, 1993). By placing programmatic

emphasis on sensory experiences, creativity, and imaginative play, it was believed that children would develop skills necessary to solve problems. These skills, in concert with instruction in reading and mathematics, would serve to foster both the mental and physical capacities necessary for these poor children to become leaders (Spodek & Brown).

These nursery programs received international attention, which resulted in the first United States nursery school opening in 1922. Unfortunately, American nursery schools were established primarily on the campuses of higher educational institutions and among the private sector (Spodek & Brown; Vinovskis, 2005). As such, nursery programs were marketed towards the emerging middle class as “child development experts saw these institutions as providing an opportunity for middle-class children to obtain better training and education than they received at home” (Vinovskis, p. 7). Unfortunately, those living in poverty were left with no viable alternative to the quality early childhood education and care programming provided by nursery schools. The alternative day nurseries, or those charitable centers of early childhood supervision that were available to the impoverished, could not afford to implement these emerging early childhood education components (Vinovskis). Resultantly, those children whose families had adequate financial resources gained access to stimulating early childhood environments and reaped the benefits of these programs, while those children in most desperate need of interventions never received assistance.

The three decades following the establishment of the first American nursery school were tumultuous times. World War II, the Great Depression and poor economic conditions left many concerned about their futures. In concert with these national events,

the status of early childhood education remained unchanged (Spodek & Brown, 1993), with only the wealthiest able to afford optimal programs for their children, nursery schools remained scarce, and charitable day nurseries continued to primarily maintain the physical needs of children. One thing that failed to remain latent, however, was the increased interest in child development. Theories of development and learning were evolving. Tied to this movement were scholars who began to challenge hereditary and invariability of intellect by proposing that differences in intellectual ability were the result of disparity in early learning opportunities and environmental conditions (Vinovskis, 2005). Hunt (1961) brought this position to the forefront by proposing that intellect was not static or absolute, but rather was influenced by an individual's experiences. Further, Hunt put forth the idea that disparities in outcomes, whether brought on by the impoverished conditions endured by the economically disadvantaged or as a result of heredity (e.g., retardation), could be counteracted through effective preschool programming. He clearly made this point in stating that "society would not be wasting its time to supply nursery-school experience for retarded youngsters of the pre-school age" as "experience, and especially early experience, is of importance" (Hunt, 1961, pp. 334-335). Bloom (1964) furthered Hunt's argument by proposing that a tremendous amount of intellectual development occurs during the critical period of a child's first four years of life, as the development of selected characteristics, inclusive of general intelligence and general school achievement, decelerate by the age of five, allowing for the conclusion that "the environment would have its greatest effect on a characteristic during the period of its most rapid development" (Bloom, p. 214).



Such assertions served as the impetus for a growing interest in early childhood care and education. In turn, this interest led to the formation of a rich research base from which the importance of ECCE quality, with respect to the immediate and long lasting effects that such programs have on young children, could be explained and analyzed. Of particular significance, are the results of the Consortium for Longitudinal Studies, a research association that was formed in the late 1960's and progressed through the mid 1970's. The goal of the Consortium was to assess whether early childhood care and education programs in fact resulted in positive effects among participating children (Haskins, 1989; Spodek & Brown, 1993). Each of these 11 programs (The Early Training Project; High/Scope Perry Preschool Program; The Gordon Parent Education Infant and Toddler Program; A Comparative Study of Five Preschool Programs; The Louisville Experiment; The Harlem Study; The Verbal Interaction Project; The Micro-Social Learning Environment; The New Haven Project; The Philadelphia Study; The Institute for Developmental Studies Program), which collectively served to gauge the efficacy of quality early childhood programming, focused on the intervention of at least 100 poor children by way of specialized curriculums (Consortium for Longitudinal Studies, 1983). Results of pooled data generally demonstrated that quality early childhood programming resulted in higher IQs and greater levels of scholastic achievement in reading and mathematics among those who attend such programs when compared to the evidenced intellect and achievement of those who did not (Consortium for Longitudinal Studies; Haskins, 1989). Moreover, participation in quality preschool programming resulted in poor youth experiencing fewer grade retentions and enrollments in special education programming throughout formal schooling than did their non-preschool counterparts

(Consortium for Longitudinal Studies; Haskins). The values and attitudes of the participating children were also significantly divergent from those of non-participants as evidenced in higher occupational aspirations and expectations for future success (Consortium for Longitudinal Studies). Finally, quality early childhood experiences were associated with higher secondary school graduation rates when compared to the graduation rates of non-attendees (Consortium for Longitudinal Studies).

Although several of the programs terminated data collection once the Consortium's report was completed, the High/Scope Perry Preschool Program, continued to collect data for decades. This long-term data collection provides historical evidence that supports the importance of quality early childhood experiences. The longitudinal project was designed to assess the effects of high quality early childhood programming on the outcomes of children living in poverty. The study commenced in 1962 and followed the developmental outcomes of 123 African-American youth from Ypsilanti, Michigan through four phases of inquiry, with the most recent outcomes reported through the age of 40 (Schweinhart et al., 2005). From 1962-1967, while in the preschool age range, children were assigned to either a treatment group, which received high quality preschool programming, or a control group, which received no preschool programming (Berrueta-Clement, Schweinhart, Barnett, Epstein, & Weikart, 1984). It was hypothesized that high quality early childhood education would result in greater scholastic success, through which children would later experience greater socioeconomic success as well as increased levels of social responsibility through later adolescence and adulthood (Berrueta-Clement et al.). Overall, the results of the effects of high quality early childhood programming were both immediate and lasting well through the age of 19.

Results most pertinent in the present discussion, with regards to improved scholastic achievement, indicated that children who participated in high quality preschool programming demonstrated improved intellectual performance in preschool, kindergarten, and first grade, however such differences were negligible by second grade (Berrueta-Clement et al., 1984). Preschool children demonstrated increased commitment to school through age 15, and were rated by their educators as having higher levels of academic motivation than their non-preschool counterparts (Berrueta-Clement et al.). When interviewed at the age of 15, children who received high quality early childhood programming “placed higher value on schooling, had higher aspirations for college, showed greater willingness to talk to their parents about school, spent more time on their homework, and rated themselves more highly on school ability” (Berrueta-Clement et al., p. 24). The effects of high quality preschool programming were contrasted by the outcomes of children not enrolled in such programs as demonstrated by higher levels of placement in special education classes, decreased levels of scholastic performance across elementary, middle and secondary schooling, and more accrued school absences than those who were enrolled in preschool (Berrueta-Clement et al.). Children enrolled in high quality preschool programming earned achievement scores that averaged over one grade level higher than their non-preschool peers at the age of 14 (Berrueta-Clement et al.). Also, youth who attended preschool programs had higher overall teacher reported grades than did children who were not exposed to high quality preschool. High school graduation was also associated with high quality preschool exposure, with 2 out of 3 preschool children graduating compared to 1 out of 2 non-preschool youth (Berrueta-Clement et al.). Moreover, high quality early childhood education was

associated with greater levels of postsecondary education, citing 38 percent of preschool youth enrolling in post-secondary academic or vocational training, compared to only 21 percent of youth who were not enrolled in preschool (Berrueta-Clement et al.). These results are astounding and support the economy of early childhood education. Precisely, high quality early childhood programming may be thought to “increase the efficiency of the educational process” by way of lowering the expenditures on special education and remedial services, as well as by increasing the output of students which results in heightened levels of academic achievement and educational attainment (Berrueta-Clement et al., p. 24).

At the same time these longitudinal inquiries into the effectiveness of quality early childhood programs began, the child study movement progressed in the United States. This was due to an increased governmental and societal focus on early childhood programs as a consequence of the War on Poverty. This newfound war placed an emphasis on the creation of early learning programs that had the potential to reduce the effects, cycle and spread of poverty (Brooks-Gunn, Fuligni & Berlin, 2003). New theoretical models of child development were being proposed, which sought to explain the cognitive development of young children in much greater detail than was available from the dominant behavioral theory of the time. Most notably were the cognitive-developmental theory put forth by Jean Piaget, and the sociocultural theory of Lev Vygotsky.

Piaget proposed that children were inherently proactive and “spontaneously initiate[d] encounters with the environment” (Green & Piel, 2002, p. 284) in order to “construct knowledge as they manipulate[d] and explore[d] their world” (Berk, 2003,

p. 20). As part of this constructivist approach, Piaget posited that children progress through four distinct stages of development in an invariant and universal manner (Berk). Over time, as greater national focus was placed on early childhood development and social science became more accepting of views disparate from the dominant behaviorist culture, many empirical studies were conducted on Piaget's proposed stages. These studies ultimately supported the invariance of these developmental stages, indicating that children universally progressed through each of the four discrete phases in sequential order (National Research Council, 2001). As a result of these and future findings, it was concluded that children are somewhat limited in their abilities during specific developmental phases, with only a few youngsters being able to work beyond a particular limit (National Research Council).

Vygotsky's view of the developing child was similar to Piaget's in that he viewed the child as an active agent in his or her own learning, however dispelled Piaget's stance that children operated independently (Berk, 2003) or synthetically constructed their own development. Rather, Vygotsky proposed that through environmental experience and the development of language skills, children engaged in social dialogues with others, which allowed them to push beyond their capabilities at a given point of development (Berk). According to the exogenous paradigm, this imperative social context, in combination with the development of private or self-speech, allowed children to develop broader and more advanced cognitive processes (Berk).

Resulting from these theoretical conclusions, early childhood professionals sought to answer the question of precisely what early childhood opportunities, interactions, and general environmental contexts should be provided to children at various developmental

stages to support and promote development (National Research Council, 2001). By utilizing the implications of the invariance and limitations of the developmental stages proposed by Piaget, as well as evidence supporting the “responsiveness of children’s development to exogenous opportunities to learn, and to interactions that support their learning” as posited by Vygotsky, the early childhood field responded with Developmentally Appropriate Practices (DAP) in 1987 (National Research Council, p. 46). The National Association for the Education of Young Children (NAEYC) constructed these standards for the purpose of ensuring that each facet of ECCE programming was appropriate and attuned with children’s developmental level, and that environmental events and interactions that supported learning were in place to ensure greater overall development (National Research Council). The importance of the underlying principles of child development and DAP have since held fast and continue to be the vehicle through which high quality early childhood programming standards are conceptualized, implemented and evaluated.

### Theoretical Basis for the Study

#### *Learning Behavior and Behaviorism*

The means of conceptualizing and measuring preschool and school-aged learning behaviors are not drawn from one particular heuristic theory, nor is any theory touted as serving as the particular theoretical orientation from which to base the concept or the importance of the behaviors. Rather, the concept and importance of preschool learning behaviors, and their school-aged predecessors, is grounded in strong empirical evidence, which is reviewed in this discourse. However, considering that preschool learning behaviors may be observed, taught and altered, as proposed by the construct’s

proponents, in conjunction with a strong empirical base, a connection between these constructs and behavior theory can be made. Additionally, considering the nature of the learning behavior construct, as proposed by leading authors of these dimensions, cognitive theory is highly applicable in their conceptualization.

Behaviorism is the theoretical orientation which posits that the study of human psychology should focus solely on the objective analysis of a human being's observable behavior (Ormrod, 1999; Watson, 1970). Traditionally, this line of psychological inquiry contends that "consciousness is neither a definite nor useable concept" (Watson, p. 2), and that the study of mental events through the process of introspection or other measures results in speculation about the occurrence of processes inside an individual (Mazur, 2002). These internal processes do not avail themselves to objective verification nor the advancement of scientific knowledge (Green & Piel, 2002). More recent behaviorist views do not necessarily negate the existence of mental phenomena, as did the traditional or methodological behaviorists, but rather acknowledge its presence and necessity in human functioning. These radical behaviorists do, however, agree with the discipline's founders in that mental phenomena cannot be viewed or measured objectively as can an individual's overt behavior (Mazur). Those that have completed the most recent work on learning behaviors hold similar views. While they do not attempt to invalidate or dismiss intelligence and other mental processes as viable entities essential to human functioning, they contend that they are of poor utility in explaining and remedying learning differences. Further, they propose that the results of inferential assessment of one's mental processes require great conjecture which does not directly translate into remedial strategies that can be embraced by educators. Rather, learning behaviors, as aligned with

the tenets of behaviorism, examine observable processes or behaviors that include discernible strategies, decision-making behaviors, and an individual's responses to the limitations of the scholastic environment (McDermott & Beitman, 1984). Such a focus of learning behavior runs parallel to that of Watson's traditional view of behaviorism which may be summarized by his keynote question: "Given a certain object or situation, what will the individual do with it?" (Watson & MacDougall, 1929, p. 9).

As noted in the introduction, particular assumptions underlie the theoretical foundation of behaviorism, make the conceptualization of learning behaviors possible, and allow for the substantiation of their importance in understanding the learning differences of young children. Mentioned previously, behaviorism does not hinge upon the internal cognitive processes of an individual as such phenomena are not observable and cannot be calculated objectively (Ormrod, 1999). The behaviorist considers placing emphasis on these processes in data collection and theory as risky (Mazur, 2002) in that one is attributing an individual's responses to environmental stimuli to mental events that can not be accurately gauged, nor explained with any degree of objectivity or certainty. Subsequently, by continuing to utilize norm-referenced measures of intellect and cognitive processes in order to explain learning differences, inaccurate assumptions and/or conclusions may be drawn. Such ill-made conclusions are counterproductive to the advancement of understanding, explaining and thwarting the learning differences that these inferential measures predict. Learning behaviors do not, however, rely on hypothetical or inferential positions of cognitive functioning as they focus solely on those behaviors exhibited by the child as they go about the learning process. As such, the inclusion and analysis of learning behaviors among young children is viable in that they



provide information regarding the child's actual classroom behavior as observed by the professional. These behavior observations are not dependent on inference, yet are potentially translatable to and informative of instructional strategies and intervention.

The primary stimulus-response association also informs the concept of learning behaviors in that the events that occur in the educational environment may be regarded as the stimuli, and the learning behavior as the child's response to these events or environmental conditions. By focusing on stimulus-response associations, objectivity can be maintained in gauging the learning style of children, a requirement of the behaviorist view (Ormrod, 1999), forgoing inference into the cognitive processes of the child. For example, in conceptualizing learning behaviors under the tenets of behaviorism, the presentation of a new classroom task may be considered the stimulus. The child's response to this stimulus may take the form of his or her reluctance to tackle the new activity. This response may be considered a negative learning behavior, and is one that may be observed and reported on objectively by the child's educator or another observer. By following such a course of science, the construct of learning behaviors remain "verifiable" and are not associated with the private, unobservable nature of one's internal events (Schwartz, 1978, p. 33). Thus, this procedure of inquiry allows for the authentic behaviors of a child to be assessed and given pure value in the absence of theoretical inference. Doing so reduces the need to speculate as to those facets of functioning that are most important and, more realistically, that are based on theoretical preference in their explanations.

As noted in the previous paragraph, environmental events may be considered to serve as the stimuli and result in a response that is considered to be a child's learning

behavior. Through these paired associations, a child may become conditioned to the occurrences encompassing the educational context. As such, the stimulus results in the exhibition of a particular learning behavior that may be either adaptive or maladaptive. Returning to the aforementioned example, a child may be introduced with the stimulus of a new task and consecutively responds to such a task by exhibiting the negative learning behavior of reluctance to tackle the activity. Thus, it would be plausible to assume that such a maladaptive learning behavior pattern would persist across future learning situations in which novel activities are presented. If this reluctance results in avoidance or escape, the negative learning behavior may be reinforced. The environment or educational context, and the events that comprise this environment, may elicit either an adaptive or maladaptive response, thus conditioning the child to respond similarly in the future.

Another point concerning the theoretical basis from which to conceptualize learning behaviors can be made. Behaviorism generally assumes that in order for learning to occur, one's behavior must transform (Ormrod, 1999). While learning behavior is not learning, as the former is the manner in which the child engages in the learning process, it is a plausible assumption that changes in instruction will result in behavioral change. More precisely, if maladaptive learning behaviors are present in a child's repertoire of responding to particular classroom or curricular stimuli, changes in these environmental events that support positive learning behaviors, will result in positive behavioral change. The reverse is true as well with a child who possesses positive learning behaviors changing his or her responses to environmental stimuli as a result of poor instructional

strategies or environmental conditions that do not serve to foster or maintain positive learning behaviors.

### *Learning Behavior and Cognitivism*

In addition to the behavioral undertones that subsume learning behavior, the influence of cognitive processes on the manifestation of behavioral patterns that constitute learning behaviors cannot be ignored. As such, the connection between learning behavior and cognitive theory can be made.

Unlike the behaviorist perspectives outlined previously, cognitive theory primarily rests on the tenet that “cognitive processes [should be] the focus of study”, as these underlying “mental events are centrally involved in human learning and must therefore be incorporated into theories of learning processes” (Ormrod, 1999, p. 168). Frankly, behaviorist and cognitive theorists greatly diverge on this central point. Cognitivists recognize the underlying importance of one’s cognitive processes in directing behavior. The applicability of cognitive processes to a child’s manifestation of behavioral patterns, as he or she engages in learning within the school context, cannot be ignored. The tenability of including cognitive theory in the conceptualization of learning behaviors is further supported in yet another general assumption of this particular theoretical orientation. Specifically, cognitive theory contends that scientific inquiry should be focused on the systematic observation of an individual’s behavior, as from this behavior it is possible to infer as to one’s underlying mental processes (Ormrod). Considering this assumption, cognitivists share in the belief that scientific inquiry must remain as objective as possible. However, these same theorists enunciate the fact that “by observing the responses that individuals make to different stimulus conditions,” they

contend “that they can draw inferences about the nature of the internal mental events that produce those responses” (Ormrod, p. 169). While at odds with the views of those that have most recently provided the empirical evidence to support learning behavior, an association between those cognitive processes that drive and manifest into one’s behavior, and learning behaviors themselves, can be made. Each of the school age and preschool learning behavior dimensions presented thus far in the current discourse (i.e., Attention/Persistence, Competence Motivation, and Attitude Toward Learning) may be thought of as primarily driven by one’s internal cognitive mechanism. For example, attention, or one’s ability to attend to particular environmental aspects, is a mental phenomenon that may be explained as largely driven and governed by complex cognitive processes. Such attentional capacity is thus translated into observable learning behavior. In line with this assumption of cognitivism, if a child demonstrates behaviors that are allied with adequate attention, such as the child is focused on schoolwork and rarely becomes distracted, inference into the child’s unobservable mental processes may be made and the conclusion drawn that the child’s cognitive processes have allowed for the formation of neural networks that support adequate attentional capacity.

#### *ECCE Program Quality and Developmental Theory*

As reviewed previously, both Piagetian and Vygotskyian perspectives of child development have served to advance the conceptualization of DAP and have led to the construction of a research base that has served to define precisely that which constitutes high quality ECCE programming. This has been achieved as both theories have proposed courses of child development that serve to inform program construction and instructional practices, and are inclusive of the most recent methods from which quality programming

is instituted and evaluated. However, the theories are distinctly unique from one another. The importance of reviewing these theoretical perspectives of child development is imperative in the context of the present discussion as these are the theoretical foundations from which early childhood environments are conceptualized. They are also the basis from which early childhood professionals base their understanding of cognitive development in children (Bredekamp & Copple, 1997).

*Jean Piaget and constructivism.* Piaget's cognitive-development theory may be considered a constructivist view of child development as children are thought of as active agents who construct their own "knowledge, intelligence and morality" (DeVries, Edmiaston, Zan, & Hildebrandt, 2002, p. 35) by being "natural philosopher-scientists whose spontaneous curiosity motivates them to fabricate ideas that make sense of their experience" (Green & Piel, 2002, p. 279). According to Piaget's theory, as children mature and progress through four distinct and invariant stages of development, they become increasingly skilled at utilizing psychological structures, called schemes, for the purpose of organizing their experiences (Berk, 2003). Of most importance in this progression through developmental stages and a child's ability to make sense of his or her surrounding world, is that of the advancement from cognitive functioning based on sensory schemes to that of increased cognition in which the child creates internal, psychologically based representations of the world which they can internally manipulate at increasingly complex levels (Berk). This increased cognition is, according to Piaget, the result of maturation and the processes of adaptation and organization.

Adaptation is considered the process by which a child constructs schemes through direct interaction with his or her environment (Berk, 2003). In order to construct these

psychological modules, two inherent and complementary processes must occur: assimilation and accommodation. Assimilation is the “tendency toward self-preservation and the incorporation of environmental sensations into the activities and systems already possessed by an individual” (Green & Piel, 2002, p. 285). This process requires that the child interpret his or her external world through the use of existing schemes in order to give their reality meaning. Accommodation, the second process outlined by Piaget, may be viewed as complementary to assimilation and entails a child either creating a new scheme to gain a better understanding of the external world or modifying previous schemes to account for new environmental features and better comprehend their surroundings (Berk; Green & Piel). As children develop and encounter increasingly novel situations in their external world, they undergo rapid cognitive change, which places them in a state of disequilibrium as assimilative and accommodative processes are unbalanced due to the likelihood that present schemes fail to account for incoming information (Berk; Green & Piel). As such, Piaget proposed the dynamic process of *equilibration*, which serves to regulate one’s adaptive activities to provide an individual with balance between what is known and that which is novel (Green & Piel). By moving between these states of cognitive discomfort and equilibrium, Piaget contended that children generate increasingly effective schemes (Berk) that propel them “toward increasingly general, more flexible cognitive organizations for adapting to novelty” (Green & Piel, p. 286). It is this increased efficiency in the adaptation of mental representations that allow children to become more avid thinkers, as they are able to organize their “experiences into meaningful, manageable and memorable units” (Berk, p. 219). These units share in composing a systematic cognitive structure that motivates

children's intellectual capacity to progress from the balance of one stage, through the novelty and disequilibrium of another, to once again obtain a balance in cognitive function (Green & Piel).

Also of importance in Piaget's theory are two knowledge aspects: operative and figurative. According to Piaget, the figurative aspect of one's knowledge is related to the organization of sensory-based data without any modification to the information (Green & Piel, 2002). This is inclusive of one's experience in touching, seeing and listening, from which the sensory data is stored in its pure form. This cognitive aspect allows a child to recognize objects such as a fire truck and a bumblebee. Through the development of language, figurative knowledge aspects expand, allowing children to count, learn names, and participate in language-based activities, (Green & Piel) all of which are included in today's preschool curriculums. Through this development of language, and through learning the names of objects, children are able to actively acquire figurative knowledge about the world (Green & Piel). The secondary aspect of knowledge in Piaget's theory, and that which underpins his entire theoretical position, is operative knowledge (Green & Piel). Operative knowledge is derived "from mental and physical activities that transform an object with properties or new relationships for classification, order, composition, and arrangement" (Green & Piel, p. 289). It is this logico-mathematical knowledge that allows a developing child to bestow order upon the complex world and gain meaning through the increasingly elaborate organization of both physical and intellectual actions (Green & Piel).

Cognitive-developmental theory is comprised of four distinct developmental stages that followed a fixed, steadfast order, and which are applicable to children across

all sociocultural boundaries (Berk, 2003). These leveled structures are considered to be stable, unified, and hierarchically ordered with each progressive stage considered a transformation of the increased internal propensities assembled within an earlier phase (Green & Piel, 2002). While each of Piaget's stages, and the constructivist approach, have served as the primary basis from which DAP have been formulated (National Research Council, 2001), emphasis in this discussion will be placed on only the second of Piaget's stages, the preoperational stage, as this stage encompasses the preschool cohort, which is the focus of this study. At approximately the age of two, children progress from the initial cognitive-developmental stage, sensorimotor, into the preoperational stage of development where notable changes may be recognized.

The most significant change is the child's increased ability to utilize mental properties for the purpose of creating internal representations that can be actively manipulated (Berk; Green & Piel). Through these semiotic functions, children in the preoperational stage of development are able to direct actions based on their ability to anticipate and coordinate such events (Green & Piel). Moreover, the development of language, as it occurs in the preoperational stage, provides children with a tremendous tool that allows for interaction with others, but more importantly, allows children to separate thought and action, and utilize these increased cognitive abilities to more readily represent and integrate information symbolically (Berk; Green & Piel). Children in the preoperational stage utilize features of figurative knowledge, or those that are formulated and organized through sensory experience, such as "mental images, memory, symbols, and language actually used by the child" (Green & Piel, p. 294). A child's operative knowledge in the preoperational stage is highlighted by "egocentric intuitions and



preconcepts that are not yet logical but are semisocialized patterns of thinking” (Green & Piel, p. 294).

Several characteristics of Piaget’s preoperational stage are essential for review as they are directly related to the understanding of cognitive development, the limitations of such development, and are those that underlie the logic of DAP. Children’s thinking in the preoperational stage of development is considered egocentric as they only focus on their personal view of the external world and its events, negating the viewpoints of others. This is the result of their thinking ability not yet being socialized (Berk, 2003; Green & Piel, 2002). Such egocentric bias does not allow the developing preschooler to fully accommodate competing information from the external world, resulting in faulty logic and conclusions (Berk). Associated with a child’s egocentric preoperational thought is animistic thinking or the belief that inanimate objects possess the human qualities of feeling and thinking (Berk; Green & Piel). This inability to yet discern the difference between human propensities and those of inanimate objects is not the only characteristic limitation put forth by Piaget. An inability of a preschool child to recognize the consistency of physical characteristics despite alteration in visible features is another cognitive limitation of this stage (Berk). Such a lack in conservative ability is a direct result of the preoperational child’s sense of centration, or their tendency to place heightened emphasis on a single aspect of a particular situation while failing to integrate other features (Berk). These preschoolers, under Piagetian theory, are also limited in their ability to classify objects hierarchically, which limits progression in discerning objects on the basis of their likeness or dissimilarity (Berk).

Limitations of this stage of cognitive development are vital as they provide the basis from which the limits of DAP for this age group have been formed, and support the notion of boundaries in children's development given a particular stage, a belief supported by the constructivist view and that which separates this cohort's thinking from that of school-aged children (Bredekamp & Copple, 1997). Of the developmental limitations, the one-way thinking ability, or what Piaget termed transductive reasoning, may be considered the most significant illogical feature of the preoperational child's cognitive ability (Berk, 2003; Green & Piel, 2002). Such thought is deemed illogical as children in this developmental stage fail to possess reversibility of thought, or the ability to reverse their thinking to make corrections or integrate competing information (Berk; Green & Piel). Piaget affirmed that this lack of reversibility was that which prevents truly logical operations among preoperational children (Berk). When considering the cognitive limitations put forth by Piaget, it may be concluded that development in the preoperational stage is capped. However, experiences that can be provided in the early educational environments, such as play and self-selected activities as recommended by Piagetian theory, can serve to expand children's development and assist in the formation of cognitive structures associated with this stage, which will help propel the child into subsequent developmental stages, the development of logical thought, and ultimately preparedness for formal schooling. DAP, and curriculums aligned with these standards, have served to define ECCE quality factors and inform quality program construction. Furthermore, those programs that embrace DAP and the constructivist overtones of play, self-selected activities and minimal teacher interference, allow for and promote

progressive child development, which results in higher levels of cognitive functioning as defined by Piaget.

*Lev Vygotsky and the exogenous paradigm.* While the Piagetian perspective of child development has been shown to be the theoretical basis on which DAP, and subsequently ECCE program quality is largely based (National Research Council, 2001), the importance of language and social interactions in cognitive development and in relation to DAP, cannot be disregarded. The exogenous nature of Vygotsky's sociocultural theory is similar to that of Piaget's stance on the essentiality of a child's explorative nature in the accumulation of knowledge. However, this point is where the theoretical positions diverge. Vygotsky's view enunciates that by using language and engaging in the social world, a child develops through the acquisition of knowledge (Berk, 2003). Of most novelty, when compared to that of the constructivist outlook, is Vygotsky's contention that private speech, or a child's self-directed speech, serves to steer their thinking and behavior (Berk). It is this self-talk that Vygotsky proposed was the foundation for advanced cognitive processes (Berk) and ultimately resulted in thought (Green & Piel, 2002). Furthermore, Vygotsky associated private speech with a child's attempts to perform a task in his or her zone of proximal development, or that which fell just beyond his or her ability to complete independently, but was possible with the assistance of a capable other (Bredekamp & Copple, 1997). Under the Vygotskyian perspective, a child's zone of proximal development defines their budding psychological functions and when tasks that fall into the zone are completed, a child will be able to achieve higher levels of performance (Green & Piel). Needless to say, the concept of presenting and assisting children in the completion of tasks, which represent the psychological

distance between their actual ability and potential ability, has had tremendous implications on the education of young children (Bredekamp & Copple; Green & Piel). Such implications are inclusive of organizing the learning context in ways that spur mental development, the development of organized psychological functions, and that produce advancement among numerous developmental processes (Green & Piel; Vygotsky, 1978).

Societal influence, another component of Vygotsky's sociocultural theory, warrants attention as it has tremendous power in forging one's development. Through language use, children are able to engage in social exchanges with others that allow for intersubjectivity, or the arrival at a common ground of understanding task completion through the modification of held perspectives. Social engagement also allows for scaffolding which enables instructors to modify the amount of assistance provided to the developing children in completing a task within their zone of proximal development, depending on task complexity (Berk). Moreover, language development and use allows society to exercise its will on the developing child as "language becomes the essence of thought" (Green & Piel, 2002, p. 268).

## Empirical Literature

### *Early Learning Style Theory and Research*

*Definition and identification of learning styles.* According to Rosenberg (1968), learning style "refers to an individual's characteristic pattern of behavior when confronted with a problem" (p. 22). These patterns of behavior are both characteristic of the manner in which an individual usually behaves and is that which constitutes his or her individual style (Rosenberg). He explained that "the style a person develops depends

upon two dimensions of his information-processing ability: locus of information and level of symbolization” (Rosenberg, p. 23).

The locus of information dimension is the extent to which an individual is receptive to new information from both his or her internal and external worlds (Rosenberg, 1968). One’s internal or intrapersonal realm is described as extremely private, and comprised of one’s most intimate thoughts, emotions, needs and beliefs (Rosenberg). Conversely, an individual’s external or extrapersonal world is comprised of all factors existent in one’s environment, inclusive of other individuals and objects (Rosenberg). According to Rosenberg, in order for one to be an effective learner, he or she must be receptive to information from both worlds in order to use this intra- and extrapersonal information to problem solve. Variation in the degree of one’s openness to receive this information is, according to the author, one manner in which individuals vary in learning style categorization. Some individuals are more in touch with intrapersonal information, while others are more in touch with extrapersonal information. Yet others are able to process both types of information at equally proficient levels (Rosenberg). These variations in one’s openness to information are the direct result of two factors. The first factor is inherent differences in two bodily sensory systems: internal and external. The second factor is an individual’s previous learning experience (Rosenberg).

The second dimension of information processing ability is one’s level of symbolization. This refers to “the level of abstraction with which the learner is able to symbolically manage information in a problem-solving situation” (Rosenberg, 1968, p. 25). The author explains that at one end of this symbolic continuum is a concrete learner who integrates incoming information in a grounded fashion. This learner is

“stimulus-bound” and not capable of providing the symbolic labels that would enable the individual to function effectively beyond his or her sensory perceptions (Rosenberg, p. 25). Conversely, Rosenberg proposed that a learner who routinely integrates all incoming information in a complex, associated manner might be considered to be at the other end of this continuum. From this two-pronged conceptualization of learning style, Rosenberg identified the four distinct learning styles of rigid-inhibited, undisciplined, acceptance-anxious, and creative. The first two styles are associated with academic failure, while the latter are associated with academic success.

The initial learning style identified by Rosenberg was that of the rigid-inhibited style. Those employing this learning style are considered to be very closed to accepting and processing both intrapersonal and extrapersonal information, and use language in an extremely concrete fashion (Rosenberg, 1968). This individual may be thought of as failing to commit academically, greatly disliking uncertainty, highly and negatively reactive to educational complexity by way of withdrawing, and as one that fails to be autonomous in decision making (Stott et al., 1983). Moreover, this learner tends to lack creativity and experiences great confusion when faced with tasks that encompass abstract ideas and lack concrete directions that are explained in a steadfast manner (Neumann, Barton, & Critelli, 1979; Rosenberg). These children may be further characterized “by rigid, dogmatic adherence to absolutistic principles” (Rosenberg, p. 30). In a summary of behavioral observations that are characteristic of students with a rigid-inhibited learning style, Rosenberg reported that these children (a) fail to complete a task unless they have immediate assistance, (b) are generally ignorant to environmental occurrences, (c) may easily become perplexed, (d) misconstrue simplistic remarks, (e) provide irrelevant

information to answer questions, (f) demonstrate low levels of initiative and assertiveness, (g) exhibit nervous behaviors, (h) are quite difficult to associate with and indifferent at times, (i) are distressed by alterations to routines, and (j) always abide by rules.

The second learning style identified by Rosenberg (1968) is that of the undisciplined learner. With regards to locus of information, this individual is extremely sensitive to intrapersonal information and is unaware of how to utilize information obtained from extrapersonal sources (Rosenberg). Regarding level of symbolization, the undisciplined learner generally utilizes information in a somewhat theoretical fashion (Rosenberg). This style was characterized by a lack of empathy, impulsiveness, poor attention and tolerance to frustration, as well as aggressiveness and inappropriate emotionality (Rosenberg; Stott et al., 1983). This learner is unable to delay gratification and is thought of as quick to change tasks that do not provide needed stimulation. Furthermore, this learner lacks a clear direction with regards to goal orientation, often engaging in various tasks with no clear purpose (Neumann et al., 1979; Rosenberg). This pattern of behavior often results in these learners avoiding participation in activities that place them in a role of responsibility for other individuals and often times leads to great difficulties in forming relations with those in positions of authority (Rosenberg). In a summary of behavioral observations characteristic of students demonstrating an undisciplined learning style, Rosenberg remarked that these individuals (a) are negativistic, (b) act defiant and will not do what is asked, (c) lack tolerance for tasks that he or she does not enjoy, (d) have tendencies to throw temper tantrums and engage in destructive activities, (e) assert independence in a negative manner, (f) have antisocial

tendencies, (g) speak disrespectfully to the teacher, (h) are prone to blame the teacher or external circumstances when things end poorly, (i) make derogatory remarks about the subject matter, and (j) break classroom rules.

The acceptance-anxious learning style type was represented as an individual who is extremely sensitive to extrapersonal sources of information, and who is unable to adequately process internal informational sources (Rosenberg, 1968). Moreover, these learners employ language in a relatively transcendent manner (Rosenberg). Individuals employing this style place great worth on the feelings of others and seemingly demonstrate a high need to be recognized. This learner is highly competitive, driven, ambitious, and demonstrates extreme conscientiousness (Rosenberg; Stott et al., 1983). However, considering this child's need for recognition, he or she may not be able to adequately deal with a problem or educational challenge as a focus on adult acceptance may pervade both thought and behavioral processes to the extent that inherent motivation for task completion is seriously diminished, if existent (Neumann et al., 1979). In order to fulfill this need for second party accolades, this learner may structure educational tasks so rigidly that he or she loses sight of the overall goal and focuses solely on the task details (Neumann et al.). He or she may engage in extreme affiliative behavior for the purpose of substantiating his or her value as an individual by way of other's acceptance (Rosenberg). Behavioral characteristics common of students with this learning style include a student that (a) tries extremely hard, (b) wants to impress other individuals, (c) is overly responsive to all forms of criticism, (d) fears not being able to please others, (e) routinely seeks educator contact and endorsement, (f) is extremely jealous of others, (g) tries to out-perform classmates with excessive amounts of quantity, (h) is visibly uneasy during



evaluations, (i) is afraid of failing, and (j) is overly friendly in relationships with educators (Rosenberg).

Creative learning style individuals are able to fully incorporate both intra- and extrapersonal sources of information. They maximize the information provided from each source, and generally employ language in a complex manner (Rosenberg, 1968). A child that is self-confident typifies the creative learning style. This child is careful to fully assess his or her own effectiveness and make rational changes when necessary based on individual experiences (Rosenberg; Stott et al., 1983). Additionally, these learners are “able to work independently and draw [his or her] own conclusions but equally able to profit from information from others, [and are] reflective and able to suspend judgment pending more information” (Stott et al., p. 64). Furthermore, this child is an active classroom participant who may deviate from the educational expectations of his or her instructor by attacking problems in an unorthodox fashion, as well as valuing teachers only to the extent that they are capable of providing information and guidance (Neumann et al., 1979). Behavioral observations of students demonstrating patterns aligned with this learning style include students (a) who explain things in an attractive manner, (b) welcome novel ideas, (c) are unwavering in solving dilemmas, (d) are creative individuals, (e) are able to incorporate new information, (f) are able to demonstrate appropriate assertiveness, (g) are prepared with materials related to coursework, (h) are generally flexible, (i) place a high importance on knowing correct answers during class discussion, and (j) respect the educators but do not require constant engagement (Rosenberg).

*Validation of the four learning styles.* The proposition of these four distinct types of learning styles resulted in an attempt by researchers to apply the learning styles delineated by Rosenberg. Neumann and colleagues (1979), investigated learning styles in a 377-subject sample of predominantly African-American adolescents for the purpose of determining the adequacy of Rosenberg's classification scheme. Also, the study examined the factor structure of a 40-item learning style scale created from the Rosenberg classification, with items worded to be congruent with each identified learning style (Neumann et al.). Thirty middle school teachers completed one checklist on each child following at least three months of formal instruction. This data was utilized in the following analyses.

Results of a principal components factor analysis with varimax rotation indicated that the checklist, which assessed each learning style by ten respective items, could be summarized by four orthogonal factors to the four learning style factors proposed by Rosenberg (Neumann et al., 1979). This conclusion was made as each of the items loaded higher on one of the four individual factors than on any other, and that such loadings were higher than  $r = .35$  (Neumann et al.). As such, it was concluded that the educators' perceptions of student learning styles did in fact assemble in the manner posited by Rosenberg. Such validation of the theoretical nature of learning styles was tremendous and provided the foundation from which additional research spawned. Most important to many researchers was the potential association, as well as the strength of the association, between the four dimensions of learning style and educational attainment criteria (Stott et al., 1983).

*Preliminary Guide to Children's Learning Skills*. Considering the theoretical nature of the learning styles identified by Rosenberg, and the subsequent lack of an empirical base from which to accurately identify the constructs of learning styles that were congruent with successful academic achievement, researchers (Stott et al., 1983) utilized earlier findings of a study on poor reading achievement to identify 14 categories of poor learning behaviors. These categories were delineated by degree of severity, with a score of zero indicative of a positive learning style and a score of 14 indicative of a poor style (Stott et al.). These 14 categories formed the second part of a learning style checklist (Stott et al.), and served as the basis for the creation of a shorter, positive learning behavior checklist. This shorter, positive learning style checklist was comprised of seven learning behavior sets identified as lending themselves to success in learning situations. The seven specific dimensions that were delineated in this list included attention, concentration, confidence, participation, self-reliance, flexibility, and alertness (Stott et al.).

The seven specific learning behaviors, as indicated by the seven learning style statements included: “(a) Shows by his answers that he is giving attention, (b) settles down well at an activity that needs some concentration, (c) copes with something new without getting nervous or upset, (d) is willing to fall in with the general activities of the class, (e) is willing to try on his own, (f) accepts help when he cannot manage a task, [and] (g) is an alert child who enters into activities with interest” (Stott et al., 1983, p. 64). The seven positive and 14 negative learning styles comprised the first and second parts of the Guide to the Children's Learning Skill (GCLS). Stott (1978) initially developed this guide for the purpose of rating the observable learning skills used by

students to gain a better understanding of learning success and failure than was provided by an intelligence quotient.

These seven learning style constructs, and the subsequent checklist, were evaluated in 62 British schools with a large sample ( $N = 2,272$ ) of 5 and 6 year old students. At the first checkpoint, teachers rated children across all seven learning styles using a 3-point scale. This scale ranged from 0, indicating that a statement or behavior was perfectly applicable to the child's behavior, to 2, indicating that a statement was not applicable (Stott et al., 1983). Total scores ranged from 0, which was indicative of good learning style, to 14, which was indicative of poor learning style (Stott et al.). One year later, each child's respective educator rated him or her in the areas of reading, mathematics and spoken language on a 5-point grading scale, ranging from 'A' to 'E'. The researchers hypothesized that "the manner in which children cope[d] with learning and problem-solving [was] closely related to their future scholastic success" (Stott et al., p. 66).

Results indicated that all of the children who were rated as possessing good learning styles consistently exceeded the reading attainment scores of children that received poor learning style ratings (Stott et al., 1983). Further, all of the seven learning styles, as outlined above, proved to be significant indicators of reading attainment scores ( $p > .001$ ), with attention, alertness, concentration and self-reliance appearing to be the most important factors in a positive, overall learning style (Stott et al.). Results further demonstrated that each of the seven learning styles were significantly correlated ( $r = -.50$ ) with each of the five reading attainment score categories (Stott et al.). Similar

results were found between learning style and the curricular domains of mathematics and spoken language, citing correlations of  $r = -.50$  and  $r = -.47$ , respectively (Stott et al.).

Such findings are interesting from both an empirical and qualitative vantage point considering that a Hartlage and Steele (1977) study conducted on the predictive power of the Wechsler Intelligence Scale for Children (WISC) observed correlations among IQ, reading and arithmetic achievement equal to  $r = .50$  (Hartlage & Steele). Such correlations are identical to those observed in the study previously discussed, and have been interpreted by others (Stott et al., 1983) as indicative of learning style providing pertinent, detailed and complementary information, when compared to that yielded by intelligence, with regards to future school achievement. Considering these results in concert, maintaining the notion that intelligence alone is the best predictor of academic achievement must at least be questioned. The tenability of such an assertion is supported when considering the degree to which learning style informs educational personnel, as well as the proposed alterability of learning styles, when compared to the staticity of a single general intelligence score. At a minimum, these findings substantiated the significance of learning styles as remarkable constructs greatly impacting a child's educational achievement, and warranted further investigation.

*Initial validation of GCLS dimensions.* In an initial follow-up study, Green, Francis and Stott (1984) examined 51 student cases, from the Stott et al. (1983) study, that were discordant in regards to students having demonstrated acceptable levels of learning style but poor levels of later educational achievement. The purpose of this examination was to determine if the initial findings, as presented previously, were in fact the product of a direct relationship between learning style and educational achievement

(Green et al.). Interviews with educators, record reviews and developmental histories were conducted and obtained on each of the cases in question. Eleven areas, as suggested by the children's teachers as negatively impacting attainment, were delineated. These areas included sensory deficits, health handicaps, underreactive coping style, overreactive coping style, abnormal behavior, lack of parental encouragement, severe family stress, physical deprivation or neglect, English as a second language, child-teacher incompatibility, and lengthy educational absences (Green et al.). It is important to note that none of the educators believed that a child's cognitive ability, or lack thereof, was the impetus for low levels of educational achievement, as it was never reported in the composition of the list.

Results indicated that each of the areas delineated could have a tremendous impact on a child's educational achievement, and explained a great deal with regards to the negative impact such factors have on the development of learning behaviors (Green et al., 1984). However, the authors stopped short of generalizing their findings and indicated that in order to generalize such results, individual analysis of each discordant case needed to be conducted with students demonstrating poor achievement (Green et al.). Nonetheless, it is important to note that these findings support the previous propositions made with regards to learning styles, and lend themselves to a greater conceptualization of the numerous variables that interact and impact a child's educational success. Finally, it is important to recognize that although this study focused on discordant cases, the findings promote the use and call for an understanding of a child's learning style, as well as a call to understand the impact that detrimental conditions or circumstance can have on academic success (Green et al.).

*Second GCLS follow-up study.* In a second follow-up to the study completed by Stott and colleagues (1983), researchers (Green & Francis, 1988) examined the relationship between the GCLS and the educational achievement of over 1,000 students. This sample was comprised of those students from the initial sample four years later, when they were between the ages of 9 and 10 years old. Additionally, the study focused on examining the test-retest reliability of the GCLS, and on evaluating the relationship between the teacher learning style ratings and academic achievement as measured by teacher ratings and standardized assessments. Also, the researchers sought to assess the consistency of learning style over the four-year period.

Results of the study demonstrated that the GCLS test-retest reliability was strong ( $.81 \leq r \leq .90, p < .001$ ), and comparable to other routinely employed measures utilized with this age group. GCLS scores proved to be reliable predictors of educational achievement at the 9 and 10-year-old educational level based on the results of educator ratings in reading ( $\tau = -.47, p < .001$ ), mathematics ( $\tau = -.50, p < .001$ ) and spoken language ( $\tau = -.47$ ) (Green & Francis, 1988). Additionally, GCLS scores proved to be reliable predictors of achievement on the National Foundation for Educational Research (NFER) standardized assessments, with correlation coefficients ranging between .54 and .77 ( $p < .001$ ). Of particular interest in this study was that of the constancy of learning skills and how these learning styles predicted educational attainment following a four-year period. Results indicated that moderate levels of constancy existed between learning styles over the four-year period; however, such levels were slightly different across gender with males demonstrating lower levels of reliability than females.

It was also discovered that the GCLS scores appeared to slightly decline with age (Green & Francis, 1988). Finally, following a four-year hiatus from evaluation, GCLS scores observed at the student's age of 5 or 6 years produced low to moderate correlations across all areas of educational attainment, with the strongest correlations noticed between GCLS scores and standardized assessment results (Green & Francis). From these results, it was concluded that GCLS scores, or learning styles themselves, were as strong of a predictor of school attainment as was intelligence, and that learning style provided "an explanation of children's attainments in school, [that] is directly induced from manifest behavior, whereas intelligence is essentially unobservable" (Green & Francis, p. 125).

#### *Learning Behavior*

To further validate and assess learning styles or behaviors, improvements upon existing methods were necessary. First, these improvements needed to be comprehensive in the assessment of learning behaviors, and reflect those behaviors that were teachable and alterable (McDermott & Beitman, 1984). Second, the assessment methods needed to be sufficiently brief to allow for relatively easy administration (McDermott & Beitman). In addition, it was required that these methods be technically adequate. To this end, McDermott and Beitman developed a scale to measure learning styles among children. This scale allowed for additional research to be conducted, as well as the continued refinement of precisely which constructs constituted learning styles.

*Study of Children's Learning Styles.* By utilizing the seven positive learning behaviors, and their respective items, from the Preliminary Guide to Children's Learning Skills (Stott, 1978), McDermott and Beitman (1984) included additional items to obtain a



more comprehensive view of learning behavior. The nine additional items included in the scale focused on children's functioning in domains "related to divergent learning strategies, flexibility, ease of transition across tasks, transfer of knowledge, learning from error, variation of interests, and foreplanning in problem solving" (McDermott & Beitman, p. 7). The included items were: "(a) Moves on easily from one task to another; (b) prefers his own way of doing things, which often doesn't work out; (c) dull or bright as it pleases him to be; (d) acts without taking time to look or to think things out; (e) shows a limited range of interests; (f) looks for ways for evading learning tasks; (g) quits tasks before they are completed; (h) makes mistakes without learning from them; [and] (i) seems unaware of what tasks call for" (McDermott & Beitman, p. 7). The logic underpinning the inclusion of these variables was reported to be that of the factors' evident responsiveness to instructional and behavior modification techniques (McDermott & Beitman). The resulting scale, called the Study of Children's Learning Styles (SCLS), was comprised of 16 items, encompassing the aforementioned learning style domains, evaluated by way of eight positively and eight negatively worded items to prevent response bias (McDermott & Beitman).

The SCLS was subsequently normed with a sample of 1,513 kindergarten students from Pennsylvania and New Jersey ranging from 4 ½ to 7 years of age (McDermott & Beitman, 1984). A total of 34 teachers completed the SCLS for each of his or her respective students following at least 50, but no more than 75 school days (McDermott & Beitman). Approximately two weeks after the educators' completion of the SCLS, children were administered the Kuhlmann-Anderson Test of Intelligence to gain information necessary in examining the potential relationship between intelligence and

learning style, as well as to determine the individual contribution of each construct in predicting one's future academic performance (McDermott & Beitman). Achievement ratings were obtained for the same group of students approximately 15 months later, during the third quarter of the first grade school year. Educators provided ratings in the curricular areas of reading, printing/writing, spoken language, arithmetic and general conduct by way of standard progress report ratings ranging from 'A' for outstanding educational performance to 'E' for of unsatisfactory educational performance (McDermott & Beitman). Achievement scores for the sample were obtained through the administration of the Comprehensive Test of Basic Skills (CTBS).

Results indicated that the items were intercorrelated, and further results of principal components factor analysis with varimax rotation indicated that the 16 items included in the SCLS resulted in factor loadings of learning style items into three dimensions that were subsequently termed Avoidant, Inattentive, and Overly Independent (McDermott & Beitman, 1984). The initial dimension, Avoidant, was indicative of behaviors that were synonymous with task avoidance and fear, particularly when such tasks were difficult or novel to the child. This learning style was reported to result in a child appearing to be detached from the learning process by experiencing difficulty in beginning a task or by demonstrating anxiety as a result of task complexity or novelty (McDermott & Beitman). A child employing the Avoidant learning style was further explained as one who was likely to be "unassertive" or "reticent" and demonstrated "constricted reactions in learning situations" (McDermott & Beitman, p. 12). Such avoidant factors have been considered to be the opposite of the positive learning style, effectiveness-motivation, identified by Stott and Albin (1975). Those items related to

impulsivity and a lack of attention comprised the second dimension of learning style, Inattention. The inattentive learning style was comprised of behaviors that are aligned with impulsivity, distractibility and a failure to provide ample attention to necessary tasks (McDermott & Beitman). The third and final dimension delineated was that of Overly Independent, and was indicative of a child that demonstrated “distinctly divergent, self-minded, and unconventional learning behavior” that, in essence, resulted in the child learning in a manner that was not conducive to the attainment of necessary skill sets (McDermott & Beitman, p. 9).

In addition, results were computed based on the numerical values assigned to teacher progress report ratings. These results were correlated with the learning style dimensions, which demonstrated that all such relationships were statistically significant between the domains and ratings ( $.29 \leq r \leq .47$ ;  $p < .001$ ). The achievement scores for each of the children were also correlated with the SCLS dimensions and proved to be significantly correlated across all achievement areas ( $-.59 \leq r \leq -.24$ ;  $p < .01$ ). Learning styles were found to be similarly correlated with intelligence ( $-.38 \leq r \leq -.30$ ;  $p < .001$ ), while the predictive power of one’s learning style was found to be only slightly less correlated with future achievement ( $r = .49$ ) when compared to that of intelligence ( $r = .55$ ) (McDermott & Beitman, 1984).

These results provided further evidence for the importance of investigating one’s learning style as a significant variable when considering the likelihood of future levels of educational achievement, as well as in determining the manner in which children learn and the subsequent strategies that could be employed to further educational success. Moreover, the standardization of this measure created the first assessment that provided a

means to evaluate preschool children while yielding information directly related to observable learning behavior (McDermott & Beitman, 1984). It must be noted that these results are favorable for the learning style measure in that the time required to administer the scale was significantly less than that of a standardized IQ measure. Further, the results indicate that learning style provides an ample amount of unique information related to a child's scholastic achievement that may serve to augment the predictive power of intelligence scales. However, being that this work was predominantly seminal, and in light of the limited availability of literature in this area, there was little additional information gained with respect to relationships among learning style dimensions, general intelligence and other relevant factors.

*Learning styles, intelligence, and achievement.* Considering the relative importance of learning styles as evidenced in the work of McDermott and Beitman (1984), McDermott posited that learning behaviors might contribute to a student's educational achievement beyond that which was accounted for by intelligence. In an extension of the previous study, McDermott conducted research with 100 kindergarten students from an east coast public school system, in order to measure learning style, intelligence and educational achievement (McDermott, 1984).

Following 50 instructional days, student's learning style was measured using the SCLS, which delineated responses into the three distinct learning style dimensions of Avoidant, Inattentive, and Overly Independent (McDermott & Beitman, 1984; McDermott, 1984). Immediately following educator completion of the SCLS, each student's intelligence was evaluated using the Kuhlmann-Anderson Intelligence Test (McDermott). Educational achievement was evaluated through two independent

measures: standardized CTBS test scores, and grades assigned by each child's educator (McDermott).

Fifteen months following the administration of the Kuhlmann-Anderson Intelligence Test, standardized CTBS scores were derived in the areas of reading, language and mathematics. During this, the third quarter of the child's first grade school year, teachers who were blind to all previous test results, assigned grades using a standard reporting scale ranging from 'A' to 'E' (McDermott, 1984). Analyses examined the relationships between the predictor variables of learning styles and the criterion variables of educational achievement by way of bivariate correlations, canonical variate loadings and standardized regression weights in order to determine the specific nature of the relationships between learning style, intelligence and achievement. Furthermore, these analyses were utilized to evaluate the contribution of the predictor variables in explaining both sets of achievement results, as well as the specific contributions of learning styles, intelligence and subsequent interactions in predicting performance in each respective area of academic achievement (McDermott).

From canonical correlation and regression analyses, results indicated that one's intelligence was the best independent predictor of educational achievement. However, it was also determined that, "learning styles account[ed] for appreciable and statistically significant proportions of the variability in later achievement" (McDermott, 1984, p. 38). Results further indicated that the inclusion of the learning style predictors with intelligence served to significantly improve prediction across all achievement areas (McDermott).

*Predictive validity of learning behavior.* Researchers next attempted to examine whether a child's learning style was prognostic of future academic success. Birrell and colleagues (1985) examined the learning styles of 431 children entering school, who were not previously exposed to formal educational instruction. Researchers assessed learning styles by way of the teacher completed GCLS. Teachers were asked to rate children on a 3-point scale with lower scores indicative of positive learning behaviors, and higher scores indicating a child's engagement in poor learning style. Two years later, these same children were rated in the basic academic skill areas of reading, mathematics, spelling and language, as assessed by standardized measures and subjective educator ratings (Birrell et al.).

Results of this study indicated that learning style was more predictive of attainment across all academic domains than were the coefficients reported in other studies using intelligence as a predictor of future educational achievement (Birrell et al., 1985). Such results provide support for the importance of learning style as a construct as well as a predictor of one's future educational achievement, possibly to a greater extent than that of one's intellect. Furthermore, considering the consistency of previous findings, it may be concluded that the behavior one employs in learning is a significant contributor to educational attainment and quite possibly success in life beyond formal schooling.

Taken as a whole, previous research has provided a foundation for the validity of the construct of a child's learning style or behavior, and has also substantiated the position that one's learning behavior is as important to future academic success as one's intelligence. Further, it has provided a basis for the continuation of research within the

area and served as a base for many to stake claims regarding the lack of information provided by an intelligence score in describing a child's learning strengths and weaknesses. Despite the promise of such findings, concern must be expressed. Although not explicitly stated by any of the authors, the previous literature failed to provide an explicit description or definition of precisely what constituted a learning style or behavior, other than that provided from early learning style theory and the interpretation of items included on previously employed measures (e.g., GCLS). While this is understandable considering the novelty encompassing the concept, as well as the great emphasis that has been placed on quantifying and applying the hypothetical construct of intelligence over past decades, such ambiguity has failed to provide clear descriptions of children's learning style as such style is "uniquely behavioral and requires no inferences concerning mediating thoughts or feelings" (McDermott, 1999, p. 281).

Prior research has also fallen short in producing a truly standardized means through which to assess these behaviors, and existing methods have been both costly and time consuming (McDermott, 1999). Furthermore, previous research did not yield normative data that could be applied to all children. It also fell short of producing the data necessary to inform and devise remedial strategies for the alteration of poor learning styles so to ensure future educational success. To this end, McDermott, by way of incorporating the theoretical underpinnings of learning styles and behaviors, and findings of past research, provided the first standardized method through which learning behavior could be assessed efficiently in the classroom environment. Additionally, this method was the first to comprehensively define learning behaviors.

*National standardization of the Learning Behavior Scale (LBS).* McDermott (1999) constructed a 29-item Learning Behavior Scale (LBS), with each item representing a distinct learning behavior. Similar to previous work (e.g., McDermott & Beitman, 1984), the items of the scale were both positively and negatively worded with observers indicating whether the behavior occurred frequently, infrequently or never. The LBS was subsequently completed by classroom teachers on 1,500 noninstitutionalized children between the ages of 5 and 17 from four geographic regions of the United States. The sample corresponded with the 1992 U.S. Census data for race, social class, family structure, the size of one's community and geographic region. Sex, age and grade level were manipulated and resulted in a sample of an equal number of males and females ( $n = 750$ ) across one-year age and grade intervals. Furthermore, proportions of exceptional children, both gifted and those identified as disabled, as indicated by the U.S. Department of Education, were included in this national sample.

In order to assess each student's cognitive functioning, the Differential Abilities Scale (DAS) was administered to 1,366 of the participants by trained or supervised psychologists (McDermott, 1999). Classroom teachers completed the Adjustment Scales for Children and Adolescents (ASCA) in order to gain insight into each child's potential psychopathology such as attention-deficit/hyperactivity and oppositional defiance.

Results of factor analysis yielded four distinct and reliable dimensions of learning behavior: Competence Motivation, Attitude Toward Learning, Attention/Persistence, and Strategy/Flexibility; in addition to a Total LBS score, which was derived from 25 of the 29 items (McDermott, 1999). While the author did not present an explicit definition of the precise learning behaviors that comprised each aforementioned construct,



interpretation of the LBS items as they loaded on each dimension, provided an ample and more thorough explanation than had been previously available.

The learning behavior dimension of Competence Motivation is considered to encompass the behaviors aligned with one's anticipation of success. It is comprised of the positive learning behaviors of a student eager to take on new tasks, one that does not continuously state that tasks are too difficult and makes attempts at solving them, one who is not hesitant or delayed in providing answers to questions, and who rarely waits for hints. A student demonstrating strong behaviors in this domain never concedes to presented educational tasks, is not fearful or resistant to novel exercises, has ample and sustained concentration, and never seeks cover in appearing bored or incompetent (McDermott, 1999).

The Attitude Toward Learning dimension represents a child's willingness to engage in learning activities. Learning behaviors comprising this dimension include a student demonstrating a strong desire to please his or her educator, a student who cares greatly about succeeding and not failing, one who is highly interested in learning activities and is highly energetic. Moreover, positive learning behaviors in this dimension represent children who are indicative of a student that demonstrates great interest and effort, never takes refuge in acting dull or incompetent, seeks or accepts assistance when tasks are difficult, is highly cooperative in class activities, and rarely concedes to difficult tasks (McDermott, 1999).

The third LBS dimension derived in the present study, Attention/Persistence, was reported to evaluate a student's level of task attention and dedication. This dimension is comprised of the individual positive learning behaviors of a student that is never

distracted nor attention seeking, a pupil who remains in his or her seat, and one who rarely fidgets or wriggles. A student with positive scores in this dimension remains on task, is concentrated on a task over a period of time, produces responses that demonstrate adequate levels of attention, and is one who cares greatly about academic success and failure (McDermott, 1999).

The final LBS dimension, Strategy/Flexibility, focuses on the manner in which a student approaches tasks. It is defined by the positive learning behaviors of performing tasks in a fashion congruent with that presented, employing logical ways to solve tasks and working well even when in a poor mood. Also, this dimension includes behaviors synonymous with a student who never acts aggressive or hostile when corrected, rarely possesses enterprising ideas that continuously fail, and a student that proceeds in a manner that is flexible and non-peculiar (McDermott, 1999).

Additional results of the study confirmed the applicability of the LBS across the sample as well as the validity of the measure, citing significant convergent validity with obtained DAS and achievement scores, and significant divergent validity with the ASCA results of psychopathology (McDermott, 1999). Results further demonstrated that the LBS accounted for a great amount of incremental predictive validity with regards to future achievement, above and beyond that of intelligence, while proving to be unbiased with regards to ethnicity (McDermott).

The importance of such findings cannot be understated. They provide not only a standard means through which to gauge one's learning behavior, but potentially serve as a first step in assisting in the correction of evidenced learning behavior deficits among children across social strata. Finally, it is important to note that the dimensions of

learning behavior, and component behaviors, are virtually identical to the 29 skill areas identified by the United States Office of Child Development over 30 years ago as essential childhood constructs necessary in successful learning and education, and as target areas that can be promoted through effective instruction (Anderson & Messick, 1974). As such, the applicability of the scale is enormous. Learning behavior scores may potentially translate to informing educational personnel as to effective intervention programming that takes into account the manner in which a child learns and the manner in which to alter curriculum and instructional variables to best serve the child's learning needs. Under this line of thought, learning behaviors have the potential to become an essential component in identifying and assisting those with learning disabilities and other educational needs. Further, the potential may exist for learning behaviors to inform and bolster the effectiveness of intervention strategies, which might align with assessment and intervention methods required under the amendments of *The Individuals with Disabilities Education Act (IDEA)* (U.S. Congress, 2004).

*Learning behavior, intelligence, and achievement.* Despite the novelty of learning behaviors, with regards to the lack of concentration on such constructs over previous decades, the importance of the independent and complementary nature of learning behaviors and the LBS have been documented. In 1999, Schaefer and McDermott analyzed teacher ratings of student learning behaviors, scholastic achievement, and intellectual ability as measured by the LBS, teacher reported grades and standardized assessment results, and the DAS, respectively. The student sample consisted of over 1,000 pupils between the ages of 6 and 17 that were blocked for gender, age and grade level while stratified in accordance to U.S. Census data across other sociodemographic

areas. Results of preliminary zero-order correlations demonstrated that intelligence and learning behaviors were “nonredundant constructs,” with only 15% of the variance between the two overlapping (Schaefer & McDermott, p. 305). Stepwise regression analyses, inclusive of learning behaviors, intelligence and student achievement, indicated that learning behaviors explained a greater amount of variance for the grades assigned by educators, while intelligence accounted for appreciable variation with regards to standardized achievement test scores (Schaefer & McDermott). Most importantly is that when taken together, learning behaviors and intelligence accounted for a significant portion of grade variability and standardized achievement score variability (32%) than either of the two constructs did independently (Schaefer & McDermott).

Similar results were found in a more recent study that assessed learning behaviors in relation to cognitive ability and academic achievement (Yen et al., 2004). Findings indicated that learning behaviors demonstrated a unique relationship with academic achievement above and beyond that of intellect alone. Further, when included with intelligence in the prediction of scholastic performance, learning behaviors served to provide increased strength through which to make such predictions (Yen et al.). From these findings, it may be concluded that learning behaviors should be considered and evaluated to an extent similar to that undertaken in evaluating the influence of one’s intellect. The inclusion of these variables may allow interdisciplinary professionals to fully understand children’s scholastic functioning, promote achievement across academic domains, and potentially unearth methods to remedy deficiencies in curricular areas. In light of the most recent research in this domain, utilizing learning behaviors and

intellectual assessment in concert may be the most efficacious strategy in achieving all of these goals.

*Technical quality of the Learning Behavior Scale.* Additional research has supported the LBS and its scale structure, technical quality and applicability to diverse groups of children. In 1998, Buchanan, McDermott and Schaefer examined the interobserver agreement of the LBS. This inquiry was necessary as educational assessment demands reliability in ratings. Examination of interobserver agreement was accomplished by having 16 special education personnel rate the learning behavior of 72 children attending special education schools on the east coast (Buchanan et al., 1998). Results indicated average levels of interobserver agreement and an absence of observer effects, yielding the scale, and the learning behaviors that comprise the scale, as reliable for use in special education environments to obtain information relevant to the individualistic learning styles of students.

Worrell, Vandiver and Watkins (2001) examined the reliability and construct validity of the LBS scores, as well as the factor structure of the scale. A total of 257 first through fifth grade students, from a single southwestern elementary school, participated. Each child's respective educator completed the LBS. Results indicated that the reliability of the LBS Total score was high across grades and gender, and that construct reliability of the individual dimension scores were moderate to high (Worrell et al.). However, results indicated that the reliability estimates of two LBS dimension scores (i.e., Attention/Persistence and Strategy/Flexibility) were not significant enough to substantiate making independent educational decisions. This is not to say that the

dimensions were unreliable, but rather that the derived reliability coefficients were approaching a level (e.g.,  $r = .80$ ) of independent utility (Worrell et al., 2001).

The validity of the LBS was also examined by Worrell and colleagues, and it was determined that results for three of the LBS dimensions were identical to those obtained previously by McDermott (1999), however the fourth LBS dimension of Attention/Persistence failed to yield similar results. The authors concluded that this may have been due to the cross-loading observed among the individual items comprising this dimension with other LBS dimensions (Worrell et al., 1999). However, such findings were likely the result of a number of limitations proposed and as such, could not be substantiated. It was concluded that the LBS, and more importantly the individual dimensions and encompassed learning behavior items, were useful in the identification and intervention of students with learning-related behavior problems (Worrell et al.).

*Learning behavior differences across demographics.* Further LBS research examined the prevalence of such learning behaviors across demographic subgroups. Schaefer (2004) analyzed the results of a nationwide survey of learning behaviors among 1,500 students, as reported on by teacher ratings of LBS items. This sample was stratified proportionately according to U.S Census data and blocked for gender, age and grade level, with participants being between the ages of 5 and 17. Results indicated that the highest number of poor learning behaviors were demonstrated by special education students (Schaefer). Further, results determined that males demonstrated poor learning behaviors more frequently than females. Males were more likely to demonstrate a non-caring attitude toward schoolwork, little desire to appease his educator, more frequently employed unconventional methods to complete tasks, and were more

distractible (Schaefer). Students identified as requiring instructional support services were determined to be more likely to seek haven in dullness, be unfocused, and rely heavily on educator hints to complete academic tasks (Schaefer).

Results further indicated that students identified as having a disability were more likely to be rated as demonstrating maladaptive learning behaviors than were their regular educational counterparts, yet were indicated to demonstrate poor learning behaviors at levels similar to those of children from parents with low educational levels (Schaefer, 2004). More specifically, “children whose parents had not completed high school were much more likely than those with parents with at least a high school degree to easily give up on learning tasks, to demonstrate significant hesitance to answer questions, and to display a lack of energy, effort and care toward their work” (Schaefer, p. 490). It was also demonstrated that as children matured, the likelihood of an educator observing poor learning behaviors decreased.

With regards to ethnicity, it was concluded that Asian and Native American minority groups were less likely to be uncooperative, unfocused and unresponsive to learning tasks than were Caucasian students. African American students were more likely than any of these groups to demonstrate problems attending, problems appeasing the educator, and difficulties in actively applying themselves to educational tasks. It was also determined that children residing in urban areas, as well as those residing in single-parent homes, were more likely to demonstrate poor learning behaviors in a number of areas when compared to those students residing in suburban areas and/or with both parents (Schaefer, 2004).

Overall, these results are interesting as they provide additional support for the LBS with regards to differentiating learning behaviors across sociodemographic boundaries. Perhaps the most important finding is that of an increased likelihood of poor learning behavior being demonstrated among groups of children generally thought to come from more difficult sociodemographic circumstances, such as residing in urban areas, in homes with a single parent, and in situations with low levels of parental education. As such, the quality of a child's educational institution, and the contrasts between the instruction provided and the overall quality of the educational environment, and how such variables interact in promoting or quelling positive learning behavior development, should be considered and fully explored. This is especially important considering that learning behaviors, as indicated in the extant literature, may be taught and altered, meaning that a significant portion of a child's future academic success is in the hands of the child's teacher as these individuals have daily educational contact with the child and are responsible for developing an educational context conducive to success. Specifically, teachers have a constant duty to provide the best educational opportunities for a child, aligned with his or her learning style, so to promote the greatest level of scholastic achievement. That said, if a child presents with poor learning behaviors, the individual most equipped to alter these behaviors is the child's educator. He or she can promote educational prowess through the differentiation of educational strategies that best meet individual needs. Such curricular modification requires that the educator devote time to constructing educational activities, as well as remediation strategies, that require the child to alter presupposed learning behaviors. Unfortunately, no research explicitly



investigating educator and classroom quality, and the development or alteration of learning behavior, has been conducted to date.

### *Preschool Learning Behaviors*

The learning behavior literature, as reviewed previously, has been inclusive of samples of children within the preschool age range (i.e., 3 to 5 ½ year old). This literature (viz., Green & Francis, 1988; McDermott, 1984; McDermott & Beitman, 1984; Stott et al., 1983) has demonstrated that the learning behaviors exhibited by this cohort are no less essential to the development of early academic skills than are the learning behaviors of children enrolled in formal school settings. As such, it has been concluded that early learning behaviors “play a fundamental role in the development of academic readiness skills” (McDermott et al., 2002, p. 354). Moreover, it may be concluded that if early learning behaviors are evident among the preschool cohort, preventative measures may be taken to avert future academic failure and promote adequate basic skill development. To this end, McDermott and colleagues (2002) developed and standardized the Preschool Learning Behaviors Scale (PLBS) for the purpose of delineating and assessing early learning behaviors within the confines of early childhood education programs.

*Preschool Learning Behavior Scale (PLBS).* The majority of the items that comprise the PLBS closely resemble the items of the LBS. However, the scales differ in that the wording of the teacher rated learning behavior items are modified to meet the informal learning context of the preschool classroom (McDermott et al., 2002). Furthermore, the PLBS has been conceptualized as focusing primarily on the content areas of “attentiveness, responses to novelty and correction, observed problem solving

strategy, flexibility, reflectivity, initiative and cooperative learning” (McDermott et al., p. 355).

Results of factor analyses conducted from three samples and data derived from the PLBS, DAS and Social Skills Rating Scale (SSRS) indicated that of the 29 items comprising the PLBS, items loaded among three distinct preschool learning behavior dimensions: Competence Motivation, Attention/Persistence, and Attitude Toward Learning. The learning behaviors that comprised the first two dimensions are very similar to those included in the LBS, while the learning behaviors that comprised the Attitude Toward Learning dimension differ when compared to the behaviors comprising this dimension of the LBS. These positive, Attitude Toward Learning behaviors included: (a) A child that is not aggressive or hostile when frustrated, (b) a child that works well when in poor moods, (c) a child that demonstrates great desire to please his or her educator, (d) a child that consistently pays attention to educational staff, (e) a child that welcomes assistance when experiencing difficulty, (f) a child that is cooperative in collaborative activities, and (g) a child that willingly accepts needed help (McDermott et al., 2002). Analyses conducted as part of the national standardization of the PLBS also indicated strong reliability and validity for the measure and for preschool learning behaviors. In addition, results demonstrated that preschool learning behaviors were in fact independent of cognitive ability, as measured by the DAS, and that positive preschool learning behaviors were associated with positive social skills and overall prosocial behaviors, while poor preschool learning behaviors correlated highly with problem classroom behavior, as measured by the SSRS (McDermott et al.).

While this was the first work of its kind, the results are encouraging. The promise of these results lie in the fact that the measure, and the component behaviors, may provide a means to evaluate a child's readiness to succeed academically and personally, as well as potentially serve as a means to recognize and thwart future scholastic failure. Furthermore, considering the potential importance of learning behaviors, such a system for evaluating preschool learning behaviors provides an alternative that may revitalize the preschool screening, assessment, and progress monitoring process as standardized measures have been lacking in that they fail to be inclusive of a child's authentic behaviors (Neisworth & Bagnato, 2004). The assessment of a young child's skills in the setting to which they are to be applied, particularly those that foster success in academics, is essential and cannot be obtained through standardized assessment procedures (Neisworth & Bagnato).

Fantuzzo and colleagues (2004) addressed the need for an additional investigation of the preschool learning behavior dimensions, and the validity of these dimensions with low-income, urban, preschool children. The study was based on the premise that in order for young children to be successful in school, they need to be exposed to quality, early learning opportunities. However, such opportunities, as noted by the authors, are often scarce in large urban areas (Fantuzzo et al.). This lack of quality programming, in addition to other factors, may impinge upon the development of essential basic skill sets, affecting early scholastic achievement (Fantuzzo et al.). As such, this study also attempted to obtain a more complete understanding of the prominent competencies that may assist in the development of early education programs for low-income children.

The study investigated the validity of the preschool learning behavior constructs with children in this social cohort by employing a multi-source and multi-method assessment. Three specific research questions were outlined by the authors: (a) Did the study generate statistically robust approaches to learning dimensions for the urban Head Start sample, (b) was the factor structure based on this sample congruent with that previously derived, and (c) were the preschool learning behavior dimensions validated by other preschool classroom competencies? (Fantuzzo et al., 2004). The authors hypothesized, with respect to the second research question, that the three original PLBS dimensions would prove to emerge with this population and that results would comport with those previously derived (see McDermott et al., 2002). With respect to the third research question, it was hypothesized that self-regulation, positive peer interaction and vocabulary competencies would provide convergent validity for the PLBS dimensions, and that maladaptive behaviors would provide divergent validity.

The subjects in this study were 642 children enrolled in a northeast Head Start Program. Subjects had a mean age of 4.9 years, with 49% reported as male and 51% female. African-American children composed 85% of the sample, while 9.7% were reported as Caucasian, 0.9% Asian, and 1.6% reported as 'others' (Fantuzzo et al., 2004). Family incomes of the sample matched the national proportions of urban Head Start programs, and the majority (76%) of the children in the sample came from a single parent home. Such a sample is both adequate in size and in representation of both genders. Further, considering the focus of the study was on low-income households, the sample accurately reflects such a population.

The measures utilized included the PLBS and the California Child Q-Sort (CCQ), with the latter being a 100-item measure employed to gain insight into each child's emotion regulation and autonomy. Additionally, the Peabody Picture Vocabulary Test-Third Edition (PPVT-III) was used to measure receptive vocabulary, while the Expressive One-Word Picture Vocabulary Test-Revised (EOWPVT-R) was employed to measure expressive vocabulary. Finally, interactive peer play in both home and school was assessed via parent and teacher versions of the Penn Interactive Peer Play Scale (PIPPS). All measures utilized in this study have been reported elsewhere to be valid and reliable, and accurately addressed the research questions.

Subjects were recruited from 41 Head Start classrooms. Following orientation and training in the Spring of the academic term, teachers received packets that contained the PLBS and the PIPPS. Parental consent for child participation was obtained and parents received a copy of the PIPPS to complete. It should be noted that 95% of parents provided consent for child participation, a rate that is remarkable. Trained observers completed the CCQ after 60 hours of observation. The PPVT-III and EOWPVT-R were administered to each child on separate days. All examiners and observers were blind to the research questions, and procedures were constant across subjects (Fantuzzo et al., 2004).

Results of PLBS analyses indicated that the three robust dimensions of learning behaviors were supported, a finding the authors indicated was identical to that found in the scale's initial validity study. Such findings also answered the second research question posed by the authors, demonstrating that the PLBS factor structure derived from the results of this sample was congruent with that previously found. With relation to the

third research question, results of the various assessment measures validated the three preschool learning behavior dimensions delineated by the PLBS. More specifically, children who scored high on the Attention/Persistence and Attitude Toward Learning dimensions of the PLBS had similarly high levels of emotion regulation. Such a finding indicates that “children’s ability to focus and sustain attention is associated with their ability to control and modulate emotions” (Fantuzzo et al., 2004, p. 224). The importance of these scores was further supported in the finding that children with high scores in these two dimensions engaged in greater levels of positive and constructive peer play interactions, as rated by both parents and educators. As such, incidents of disruptive behavior were minimized when children demonstrated higher levels of focus and engagement. The inverse of the above findings were also demonstrated as children who received lower ratings in both dimensions were less likely to be engaged and more likely to display disruptive behavior (Fantuzzo et al.).

Another important finding was that children who scored highly on the Competence Motivation dimension were noted as being more autonomous. These children were characterized as more independent, exhibited greater levels of initiative and were more connected with their respective peers during free periods (Fantuzzo et al., 2004). The inverse for high Competence Motivation dimension scores was reported as well, with the children receiving low scores across this dimension being less autonomous and more disconnected from peers. It was also reported that emerging vocabulary skills were positively correlated with each of the learning behavior dimensions, however such correlations were relatively low (Fantuzzo et al.).

The findings of this study are a promising second step in support of preschool learning behaviors and their applicability to children across sociodemographic boundaries. The findings confirmed the three original PLBS dimensions and demonstrated how they are associated to behaviors conducive to success in early educational environments, and potentially formal schooling. However, the present study was limited with respect to the applicability of the findings to other vulnerable groups of children across sociodemographic boundaries. More specifically, generalizability of the PLBS to predominantly Asian or Mexican American children is not known, nor is the generalizability of findings to low-income children residing in rural locations (Fantuzzo et al., 2004). What is also not known, across these groups, is precisely how the quality of early childhood care and education environments impacts the formation and maintenance of preschool learning behaviors as no study to date has examined the potential connectedness of preschool learning behaviors and ECCE programmatic quality factors.

*PLBS dimensions.* As demonstrated in the aforementioned studies, three distinct dimensions of the preschool learning behavior emerged: Attention/Persistence, Competence Motivation and Attitude Toward Learning. Those proposing and supporting the construct have described each of these dimensions as essential to academic success. Extant literature also provides support for these areas as those that are crucial to a child's academic success. In the context of the present discourse, one's level of attention in the educational context, is comprised of the behaviors of never appearing distracted nor attention seeking, one who remains in his or her seat, one who rarely fidgets or squirms, one who remains on task, is concentrated on a task over a period of time, produces responses that demonstrate adequate levels of attention, and is one who cares greatly

about academic success and failure (McDermott, 1999). Generally, such behaviors have been the focus of educators and researchers for sometime. Most importantly, emphasis on a child's ability to evoke a level of focus commensurate with that demanded by a presented educational task, as well as required in other areas of one's daily functioning, became the primary focus of childhood disorders research in the early 1990's. Since this time, numerous studies have and continue to be conducted on children that have deficits in such areas of functioning, or those who have features associated with a diagnosis of Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD).

Research has demonstrated that children and adolescents who manifest attentional difficulties have trouble in areas such as "selecting and focusing on relevant stimuli in the environment, coupled with starting or executing tasks; maintaining concentration and distraction; consistently mobilizing effort in a task oriented direction; organization, forgetfulness and recall of learned information; and [in] making transitions from one task to another," and often suffer from numerous negative consequences (Robin, 1998, p. 15). The most prominent of the features associated with attentional deficits, along with the hyperactive and impulsive symptomology noted among children with the disorder, include numerous academic complications inclusive of poor academic performance (Frazier, Youngstrom, Glutting, & Watkins, 2007), and increased incidence of failing grades and grade retention (Fergusson, Lynskey, & Horwood, 1997). While not explicitly termed learning behavior, the connection is clear; children who have low levels of sustained attention, often demonstrate academic difficulties that are similar to those of children with poor learning behavior.



Competence Motivation is another of the PLBS dimensions proposed by the constructs' authors. It has been described as encompassing the behaviors aligned with the anticipation of success, inclusive of those comprised of the students' eagerness to take on new tasks, and to make attempts at solving tasks despite their level of difficulty. A child with strong learning behavior in this dimension is further described as one who is not hesitant or delayed in providing answers to questions, one who rarely waits for hints, one that never concedes to tasks, is not fearful or resistant to novel exercises, has ample and sustained concentration, and never seeks refuge in appearing dull or incompetent (McDermott, 1999). Aside from that conducted and proposed via learning behavior research, other authors and studies provide support for the importance of Competence Motivation. Generally, motivation is "an internal state that arouses us to action, pushes us in particular directions, and keeps us engaged in certain activities" (Ormrod, 1999, p. 407). Those individual's that are more highly motivated tend to achieve at much higher levels than those that are not (Ormrod, 1999). This may be due to the fact that within the educational context, "achievement motivation is connected to the need for power and competence" (Sullo, 2007, p. 25). Children will want to perform scholastically so long as their motivation is tied to recognition of success through reinforcement and through gaining a complete understanding of the task before them (Sullo, 2007). Regardless of the precise psychological underpinnings of Competence Motivation, which is beyond the scope of this discourse, it is undeniable that motivation affects one's learning and behavior. As summarized by Ormrod (2003), numerous studies (Csikszentmihalyi & Nakamura, 1989; Eccles & Wigfield, 1985; Larson, 2000; Maehr, 1984; Maehr & Meyer, 1997; Pintrich, Marx & Boyle, 1993; Pintrich & Schunk, 2002; Schiefele, Krapp,

& Winteler, 1992; Voss & Schauble, 1992; Walberg & Uguroglu, 1980; Wigfield, 1994) provide evidence that indicates that motivation affects student learning and behavior. It directs a student's behavior toward the accomplishment of certain goals, drives the expense of heightened levels of energy and effort, "increases initiation of, and persistence in, activities," evokes higher levels of mental processing, "determines what consequences are reinforcing," and in light of these previously mentioned effects, motivation ultimately results in higher levels of academic performance (Ormrod, 2003, pp. 368-369). Results of additional research shows that students who demonstrate low levels of motivation, are more prone to academic failure as indicated in increased rates of high-school non-completion (Vallerand, Fortier, & Guay, 1997). From these findings, it may be determined that the inclusion of such variables in the PLBS, and in the conceptualization of which behaviors are essential to academic success, are warranted and their importance supported.

The final PLBS dimension proposed is that of Attitude Toward Learning. As outlined previously, this dimension of learning behavior has been described as encompassing the behaviors of not becoming aggressive or hostile when frustrated, one that works well when he or she is in a bad mood, a child that shows a great desire to please his or her educator, one that routinely pays attention to educational staff, a child that accepts adult assistance when he or she is having difficulty, a child that is cooperative in group activities, and one that is willing to accept help when it is needed (McDermott et al., 2002). As with the other learning behavior dimensions, Attitude Toward Learning is supported in the extant literature as an influential feature impacting students' scholastic success. For instance, results of a study conducted by Tse and

colleagues (2006) on the attitudes toward reading of over 13,000 students from Hong Kong, Singapore and England, found that attitude and attainment were highly correlated. More specifically, results demonstrated that children who had “more positive reading attitudes and higher self-concepts were more likely to gain higher achievement scores” (Tse, Lam, Lam, Chan, & Loh, 2006, p. 83). The inverse of this finding was found to be true as well, with lower achieving students demonstrating lower attitudinal levels (Tse et al.). Other studies have found similar results with regards to the importance of children’s attitudes and educational outcomes. A study conducted by Graham, Berninger, and Fan (2007) explored the structural relationship between first and third grade student attitudes toward writing and their academic achievement in this domain. Results of their analysis concluded that one’s attitude toward writing directly influenced his or her achievement (Graham et al.). Moreover, it was reported that within this model, the “direct path between attitude and achievement was statistically significant” (Graham et al., p. 532).

#### *Developmentally Appropriate Practices*

As previously discussed, the historical emphasis placed on early childhood programming and experience in the United States has taken disparate routes. On one hand, many have emphasized and only been able to partake in childcare environments that met the most basic needs of children, inclusive of feeding and clothing, and served as a center of supervision for a child while a parent was working. These programs were created in response to the need of the impoverished and the influx of working mothers in American society. They assumed full and half day, daycare programs with an underlying feature being that of participating children establishing meaningful relationships with caregivers and learning to socialize with peers through engagement in various tasks. The

other line of early childhood programming has placed emphasis on *pre-schooling* and on the importance educating of young children (National Research Council, 2001). Such programs have focused on the instruction of facts and skills by professional educators with the goal of academic readiness. However, a growing consensus over the most recent decades has recognized that these two facets of early childhood experience are not mutually exclusive, but rather conjoined in that both must be present in order to ensure the optimal development of young children (National Research Council).

Childcare and preschool programs are now generally considered to be early childhood care and education centers (ECCE), embodying decades of research and the belief that the most appropriate manner through which to ensure adequate development across domains essential to early childhood prosperity is to target all areas, meeting not only children's early academic needs, nor solely attending to children's social, emotional and physical needs, but rather meeting these needs holistically. In short, the current underlying belief of the ECCE program paradigm is that "thinking and feeling work in tandem" (National Research Council, 2001, p. 2). As such, the *quality* of ECCE programming, the collective variable name given to both the academic and care components of ECCE programmatic structure, has long been of primary focus to researchers, parents, and stakeholders. The foundation from which these qualitative components of ECCE structure have been and are currently conceptualized is embodied in NAEYC's *Developmentally Appropriate Practices*.

Developmentally Appropriate Practices (DAP) are the teaching and decision-making practices of early childhood educators with the goals of "creating a caring community of learners, teaching to enhance development and learning,

constructing appropriate curriculum, assessing children's learning and development, and establishing reciprocal relationships with families" (Bredekamp & Copple, 1997, p. 16). Such developmentally appropriate teaching and decision-making practices are informed by at least three types of information. This includes that which is known about child development and learning, that which is known about each child's individual strengths, weaknesses and interests, and that which is known about the social and cultural circumstances in which children live (Bredekamp & Copple). These practices, as initially outlined in the NAEYC position statement, *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8* (Bredekamp, 1987), provide DAP based on the different age levels of children (Bredekamp & Copple). This results in children being conceptualized as active learners and gaining knowledge through age appropriate play and exploration (Van Horn, Karlin, Ramey, Aldrige, & Snyder, 2005; Van Horn & Ramey, 2003). The DAP for the early childhood cohort, which encompasses those children between the ages of 3 and 5, incorporate developmental standards and expectations for each of the respective age groups in the domains of gross and fine motor development, language and communication development, cognitive development, as well as social and emotional development (Bredekamp & Copple). Acceptance of these principles, and the employment of instructional practices and environmental construction that parallel such standards, results in commonalities among ECCE classrooms as they focus on multiple developmental areas inclusive of the cognitive, social and physical realms (Bredekamp & Copple; Van Horn et al., 2005). These centers infuse "ideas and learning across multiple subjects, incorporating areas such as math and science" while focusing on the "process of learning

and gathering knowledge” as “learning to learn is considered a priority” (Van Horn et al., 2005, p. 326).

To promote DAP, as well as to enhance the focus of all interdisciplinary professionals, NAEYC formed an accrediting body with the purpose of recognizing early childhood programs that exemplify a commitment to high quality programming (NAEYC, 2005). In order to achieve this goal, NAEYC sought to operationalize DAP through the development of the 10 NAEYC Early Childhood Program Standards. According to NAEYC, a high-quality early childhood program is one that: (a) promotes positive relationships; (b) implements a curriculum that fosters social, emotional, physical, language and cognitive development; (c) utilizes appropriate and effective teaching strategies; (d) evaluates child progress across developmental domains; (d) promotes the health and safety of both children and staff; (e) employs highly qualified personnel; (f) engages families in collaborative relationships; (g) establishes and utilizes community based relationships; (h) maintains a safe and healthy physical environment; and (i) implements high quality program governance (NAEYC; for a complete description see NAEYC, 2005).

#### *Immediate and Long-term Effects of High-quality ECCE programming*

The importance of high quality early learning and care opportunities, as measured by their immediate and long-term effects on participating children, has been well established. Numerous studies conducted over previous decades have reported on the significance of these experiences, however those that appear to be most frequently referenced in the early childhood literature, with relation to the positive impact of high quality programming, are longitudinal in design. These studies, some which have

spanned over four decades, enable those in the fields of early childhood education and the social sciences to confidently state that high-quality ECCE programs are important. These studies are also the basis from which the claim can be made that high quality programs significantly impact cognitive, academic, social, and emotional development well into adulthood. Moreover, these studies are the basis from which the most recent methods of conceptualizing, evaluating and altering ECCE program quality have been devised.

Mentioned earlier, the results of the Carolina Abecedarian project have provided support for the importance of high quality early childhood programming. This project, which provided intensive early educational programming to young children beginning in infancy, sought to measure the effect that a supportive learning environment could have on preventing mild retardation and school failure among impoverished Carolina Appalachian children (Campbell & Ramey, 1994). Between 1972 and 1977 four cohorts of children, who met the study's high risk classification, were assigned to either experimental or control preschool conditions, with half of those enrolled in the preschool condition selected to receive kindergarten intervention as well (Campbell & Ramey). Results of the program were astounding. Children enrolled in the experimental preschool condition demonstrated significantly higher IQ scores than those children in the control group through eight years of age (Ramey & Campbell, 1984, 1991). Furthermore, following three years of formal schooling, children who received high quality programming consistently outperformed children who were deprived of such programming in the curricular areas of mathematics and reading (Ramey & Campbell). Results of a four-year follow-up, after children completed seven years of formal

schooling, indicated that the impact of high quality early childhood programming had lasting effects. Children who received high quality programming at an early age demonstrated both significant intellectual and academic gains beyond those of non-preschool children that persisted well through seven years of schooling, and served as some of the strongest evidence of the impact of high quality early childhood programming (Campbell & Ramey). Other longitudinal research programs have derived similar results.

The Early Training Project, a longitudinal study that commenced in the 1960's, sought to evaluate the effects of high-quality preschool programming on 86 impoverished African-American youth, with the program's overarching goal being that of "offset[ing] the progressive retardation often observed in children from lower economic strata as they advanced through their years of schooling" (Gray, Ramsey, & Klaus, 1982, p. 14). It was conceived that the goal would be achieved if an early educational program would serve to promote both social and intellectual competence, two components necessary for school success (Gray et al.). Four groups of children were randomly assigned to one of two treatment groups, which differed by age prior to school entrance, while the third and fourth groups were control groups. The intervention program for the treatment groups consisted of a high quality, ten-week summer school program which was followed by two, 9-month periods of home visits from a certified teacher during the winter months (Gray et al.). Each home visit lasted one hour during which the teacher, child and parent would work collaboratively with one another. Children in all groups were assessed numerous times across multiple functional domains inclusive of intellect, language and school achievement (Gray et al.). Immediate results of the study indicated that those in



the experimental groups had consistently superior intelligence scores, as measured by the Stanford-Binet, when compared to those in the control groups (Gray et al.). At the end of first grade, children in the experimental groups also demonstrated superior achievement results in the areas of word knowledge, word discrimination and word reading (Gray et al.). Unfortunately, the results of the affective measures failed to yield any statistically significant differences among the children, which the researchers attributed to the fact that “motivational and attitudinal changes are extremely difficult to assess, especially with relatively young children” (Gray et al., p. 120). Upon reviewing the later results, certain enduring gains were noticed. Changes in intellectual performance were noted as lasting through the fourth grade, however such intellectual superiority was demonstrated to decline by the completion of schooling (Gray et al.). Significant differences in scholastic performance between those in treatment and control groups were also present, with treatment group students outperforming their non-preschool counterparts as indicated by higher graduation rates and counselor ratings, particularly among treatment group females (Gray et al.).

More recent studies have found results that similarly support the efficacy of high-quality early childhood programming. In a 2002 NICHD study, researchers examined the relationship between the quantity, quality and type of childcare environment and the outcomes of more than 1,000 children across cognitive, language and social domains at the age of 4 ½ years (NICHD Early Child Care Research Network). Three cognitive outcomes were considered. First, pre-academic skills were evaluated by the Letter-Word Identification and Applied Problems subtests of the Woodcock Johnson Achievement and Cognitive batteries. Language was assessed via the Preschool

Language Scale-Third Edition (PLS-3), and short-term memory was measured by the Woodcock Johnson Cognitive Memory for Sentences subtest. Results of multivariate analyses indicated that functioning across domains was significantly associated with childcare and the quality of such care (NICHD Early Child Care Research Network). More specifically, children that participated in higher quality child care obtained higher scores on tests of pre-academic and language skills when compared to their lower quality childcare counterparts (NICHD Early Child Care Research Network). Those children enrolled in programs that experienced quality increases during their participation experienced higher pre-academic skills than those children enrolled in programs where quality decreased. Further, “children who had more center experience displayed better language skills and better performance on the memory test than did children with less center-type experience” (NICHD Early Child Care Research Network, p. 151).

A recent report by the NICHD Early Child Care Research Network, on the early childhood findings of the NICHD Study of Early Child Care and Youth Development (SECCYD) provides additional supporting evidence. The SECCYD study examined the effects of variation among early childhood care experiences related to children’s cognitive, language, social, emotional, and health development (NICHD Early Child Care Research Network, 2006). The study examined over 1,000 children from birth through 54 months of age, with primary outcomes data collected across six time intervals. Results indicated that children exposed to higher-quality care experienced higher scores across measures of cognitive functioning, social functioning, and peer relations (NICHD Early Child Care Research Network). Moreover, it was reported that children enrolled in greater amounts of childcare demonstrated higher cognitive skills at 24 months of age,

demonstrated greater receptive language skills at 36 months of age, and performed better on measures of memory functioning at 54 months of age (NICHD Early Child Care Research Network).

Similar effects of ECCE quality programs are noted among non-longitudinal studies. Peisner-Feinberg & Burchinal (1997) hypothesized that higher-quality child care would be associated with greater child outcomes. In order to test this hypothesis, data was collected across 828 children, their families and respective early childhood classroom settings. This included the quality of early childhood classroom environments, as measured by the Early Childhood Environment Rating Scale (ECERS), and early childhood educator sensitivity as measured by the Caregiver Interaction Scale (CIS). Child centeredness was assessed by using the UCLA Early Childhood Observation Form, and educator responsiveness to the needs of children was evaluated by the Adult Involvement Scale (AIS) (Peisner-Feinberg & Burchinal). Information related to each child's cognitive and socioemotional development was obtained via a wide range of assessments inclusive of the Peabody Picture Vocabulary Test-Revised (PPVT-R) in order to gauge language skills, the Woodcock-Johnson Tests of Academic Achievement to assess pre-academic skills, and the Attitudes/Perceptions of Competence in order to evaluate each child's self-perception and attitude toward their ECCE program (Peisner-Feinberg & Burchinal). In addition, early childhood educators provided ratings of children's social and cognitive skill using the Classroom Behavior Inventory (CBI), and the quality of their relations with each child by way of the Student-Teacher Relationship Scale (STRS) (Peisner-Feinberg & Burchinal).

Results of analyses indicated modest to strong associations between results of child measures and those of ECCE quality. More specifically, observational measures of childcare quality were significantly associated ( $p < .001$ ) with all measures of children's cognitive skills, as well as with the positive aspects of social functioning ( $p \leq .05$ ) (Peisner-Feinberg & Burchinal, 1997). Also of interest are the results of inferential analyses into childcare quality and child outcomes. Following statistical adjustment for child and family characteristics, results demonstrated that pre-reading scores, as derived from the Woodcock Johnson, were significantly related to the aforementioned quality variables (Peisner-Feinberg & Burchinal). Further, a significant relationship between language development and classroom quality factors was noted as higher PPVT-R scores were "related individually to higher observed classroom quality and closer teacher-child relationships" (Peisner-Feinberg & Burchinal, p. 467). Math skills were similarly related to childcare quality ( $p = .03$ ), as were educator's ratings of a child's sociability ( $p < .0001$ ) (Peisner-Feinberg & Burchinal).

These results indicated that high-quality childcare was related to positive preschool outcomes across multiple domains. More specifically, these results provide additional support to the literature in that the findings indicate that there is a positive relationship between ECCE center quality and young children's cognitive and social development (Peisner-Feinberg & Burchinal). Such findings are important not only because they provide further support for the conclusion that high-quality ECCE programming is essential to and greatly impacts child development, but also because they indicate that early childhood development and outcomes are important to a child's

preparedness to enter school ready to learn as requisite skills across multiple domains are developed.

In another ECCE quality impact study, Wylie & Thompson (2003) analyzed the data of the Competent Child project in order to unearth the long-term impact of quality early childhood programming on children's performance across domains 10 years later. Specifically, this New Zealand based project sought to examine the immediate, intermediate, and long-term contributions of early childhood educational programming on the formation of childhood competencies that appeared to serve as the foundation of successful learning (Wylie & Thompson). These competencies included knowledge and skills across the domains of literacy, mathematics, problem solving, communication, perseverance, social skills with peers and adults, personal responsibility, motor skills, and inquisitiveness (Wylie & Thompson). The authors employed multiple measures to gauge the particular aforementioned competencies, most of which were assessed by each child's educator (Wylie & Thompson), although the description of how other areas were assessed lacks specificity as to precisely which measures or assessment procedures were employed. Essential early childhood quality factors and related constructs were also assessed, which included the length of children's experiences in ECCE environments, the quality of the environment, children's use of services available at the ECCE center, parental involvement in the program, as well as income and socioeconomic variables (Wylie & Thompson).

Analyses of these variables across the sample of 307 children indicated that program factors did in fact have an impact on children's progress at the age of 10 years. The ECCE program's impact was noted across the domains of literacy, mathematics and

peer social skills, with the researchers noting that the impacted “factors [were] mainly to do with the quality of early childhood education” (Wylie & Thompson, 2003, p. 72). Specific differences in the impact of ECCE program quality were noted. Centers whose staff failed to engage children in open-ended dialogue, obtained ratings in the bottom quartile. At the age of 10 years, children from these programs attained reading comprehension scores that were an average of 10 percentage points below their peers, and mathematics scores of approximately 7 percentage points below (Wylie & Thompson). Those centers that were “print-saturated,” meaning that print was incorporated and regarded as an enjoyable and critical component in everyday life, noticed 5 to 6 percentage point gains when compared to peers who were deprived of such exposure (Wylie & Thompson, p. 74). ECCE centers that encouraged children’s active selection and participation in activities from several learning centers noticed higher levels of adult-child and child-child relational ratings as well as greater ratings of individual responsibility (Wylie & Thompson).

Yet another positive outcome related to ECCE quality was found among centers whose staff actively guided children through activities. These children experienced outcome results, at the age of 10 years, of mathematics and reading scores being approximately 10 percentage points higher than their non-high quality ECCE counterparts, and personal responsibility ratings of approximately 5 percentage points higher (Wylie & Thompson, 2003). Such a result may not be surprising considering the Vygotskyian assertion regarding children’s zone of proximal development and the great influence more skilled assistants, or adults, can have on children’s cognitive development by way of assisting them in complex task completion. Furthermore, when high-quality

ECCE program staff engaged children in play, reading comprehension scores were noted as being approximately 5 to 10 percentage points higher than peers, while mathematics scores were approximately 11 percentage points greater, when family income was accounted for (Wylie & Thompson).

Also of interest from these results of ECCE quality analysis is that of the effect of an adequate number of age-appropriate resources. Wylie & Thompson (2003) report that children participating in “those EC[C]E centers [that] were above the median for this item scored around 4 percentage points more for social skills with peers” (p. 75). Mathematical competency was also noted to be 10 percentage points higher among children from high quality programs that encouraged children to complete their work (Wylie & Thompson). Finally, it was determined that children who participated in environments that actively encouraged cooperation and support of one another witnessed reading comprehension results of approximately 7 percentage points higher than facilities that did not embrace this practice (Wylie & Thompson). Collectively, these results indicate that ECCE quality can have a tremendous impact upon the lives of children years following their participation in the program, and provide additional support for the importance and impact of high-quality programming. Moreover, such variables, when considered in concert, “indicate learning environments which provide plenty of opportunities for dialogue, for practical development of skills and the linking of the exercise of concentration with the reward of completion and enjoyment” (Wylie & Thompson, p. 75).

The long-term positive effects of ECCE quality programming is further reinforced by the results of a longitudinal study conducted by Broberg, Wessels, Lamb, & Hwang

(1997) in which 146 children were enrolled in either in-home or out-of-home care beginning at 19 months of age. These children were followed for seven years and participated in a total of five waves of data collection inclusive of an assessment of verbal ability and mathematical ability. Other factors of development, care and family structure were encompassed in data collection and included number of siblings, inhibition, family background, quality of home care, each participating child's level of parental involvement, the amount of time in day care, and the quality of out-of-home care (Broberg et al.).

While a number of analyses were conducted to include all of the aforementioned variables, those of specific interest, in the context of this discussion, are related to the type and quality of early childhood care experiences and children's cognitive ability scores during the second grade. A series of one way analyses of variance (ANOVA) were conducted among the type of care the children experienced (i.e., home care, family day care or center day care) and the results of tested verbal and mathematical abilities (Broberg et al., 1997). The results consistently favored those children who participated in quality center based care as they demonstrated significantly higher levels of verbal and mathematical ability at the age of 8 years when compared to those children in either home care or family day care (Broberg et al.). As such, it was concluded that center day care had a positive effect on children's cognitive ability, and that the quality factors of center day care, inclusive of the quality of child and staff interactions, as well as group sizes and age ranges of participants, proved to be predictive of both verbal and quantitative abilities (Broberg et al.). These findings provide further support for the



positive effects high quality early childhood programming has on young children's development and competencies.

### Conclusion

When examined independently, the results of studies conducted on both learning behavior and quality ECCE programming are substantial. Learning behaviors have been demonstrated to be independent constructs that are correlated with the scholastic achievement of children, while remaining free of inference into one's cognitive processes, a positive feature considering the difficulty surrounding the use of standardized assessments with young children. Learning behavior has also been demonstrated to augment the predictive power of intellectual measures, potentially allowing for greater accuracy in the prediction of future scholastic difficulties.

Furthermore, these discrete behavior sets, when considering that they are those responses recognized and rated by a child's respective educator, hold the potential to be directly translated into instructional as well as intervention strategies that may serve to thwart later academic failure.

High-quality ECCE programming has been shown to have a tremendous impact on the lives of youth. Those engaged in environments that employ instructional practices and that construct environments attuned with children's developmental level, serve to promote cognitive development that results in school readiness and greater academic gains. Children have also benefited from these programs through higher rates of secondary school graduation and lower levels of special education enrollment. Moreover, children who have participated in quality programs experienced greater overall gains,

which may be extended to the proposition that in light of high-quality ECCE programs, children will have better life-long outcomes.

However, little is known with regards to the potential interconnectedness of these positive outcomes variables. More specifically, if both learning behaviors and quality ECCE programming are associated with greater academic achievement, one must question what the nature of the relationship is between these two constructs. By examining this potential relationship, further information may be obtained that will serve to guide the development of ECCE programs, and comprising curriculums, to foster preschool learning behavior development. Moreover, considering the limited literature available pertaining to preschool learning behavior, an examination of this construct would, in and of itself, provide a wealth of information that may warrant further inquiry.

## CHAPTER III

### METHOD

#### Participants

##### *Power Analysis*

A power analysis was conducted using *G\*Power* (Faul & Erdfelder, 1992; Erdfelder, Faul, & Buchner, 1996) to determine the minimum sample size necessary to detect a statistically significant difference between the three ECCE quality groups. The analysis was conducted for a one-way ANOVA with an established significance level of .05 ( $\alpha = .05$ ). The effect size for the analysis was set at  $f = .30$ , as such an effect size was moderate and it was believed quality ECCE programming did in fact have an impact on the formation of learning behaviors and the development of early academic skills. This effect size was also chosen considering the strong associative relationship between school-aged learning behaviors and scholastic achievement. Power was set at .70 as such a level is indicative of adequate power for a statistical test, or an adequate level from which the null hypothesis would be accurately rejected if in fact a difference existed between the two groups (Yaremko, Harari, Harrison, & Lynn, 1982). Results of the *G\*Power* analysis indicated that a total sample size of 90 would be necessary, indicating a minimum of 30 subjects per group ( $F(2, 87) = 3.1013; \lambda = 8.10$ ).

An a priori power analysis was also completed using *G\*Power* (Faul & Erdfelder, 1992; Erdfelder, Faul, & Buchner, 1996) in order to determine the required sample size for detecting significance in an *F*-test of multiple regression analysis. The effect size was set at  $f^2 = .15$ , as such an effect size, in a multiple correlation or multiple regression analysis, is considered moderate according to Cohen (1988). The significance level was

set at  $\alpha = .05$ , using a moderate power level of .70 and with the 16 ECCE quality predictor items as determined by Cassidy et al. (2005). It was determined that a total sample size of 121 ( $n = 121$ ) would be necessary ( $F(16, 104) = 1.7417; \lambda = 18.15$ ). Such a required sample size was larger than the 90 indicated in the prior power analysis and as such, the 121 participants required in the present a priori power analysis was determined to be the minimum sample size for the study. With such a sample size, it was determined that a minimum of 41 children would be required in each of the three quality groups.

### *Participant Characteristics*

The participants of the study included male and female preschool aged children enrolled in ECCE programs in southwestern Pennsylvania. High quality programs were recognized as those with NAEYC accreditation, or as those with three and four star Keystone STARS status. Medium quality programs were identified as those with two stars in the Keystone STARS program. Those programs with one or zero stars in the Keystone STARS program, or that were not identified on either the NAEYC or Keystone STARS list, were identified as low quality. Quality status was confirmed by way of ECERS-R total scores. ECCE programs were then placed into a high, medium, and low quality group based on the ECERS-R total score for each facility. Participation in the study was open to all children participating in a preschool program, who were between the age of 4 and 5 years, 11 months. Informed consent was obtained from each child's parent prior to his or her participation in the study.

## Measures

### *Preschool Learning Behaviors Scale (PLBS)*

The learning behaviors demonstrated by the participants in this study were evaluated by the Preschool Learning Behaviors Scale (PLBS). The PLBS is a norm-referenced, standardized measure of learning behaviors exhibited by children between the ages of 3 and 5 ½ years (McDermott et al., 2002). This teacher-completed measure consisted of 29 altered valance items, each of which represented a specific learning behavior among the three preschool learning behavior dimensions of: Competence Motivation, Attention/Persistence and Attitude Toward Learning. Children's ECCE teacher rated the child retrospectively, based on the previous two months of typical preschool behavior, by way of utilizing a 3-point scale, with descriptors including *Most often applies* (0), *Sometimes applies* (1), and *Doesn't apply* (2) (McDermott et al., 2002). Responses were tallied following the early childhood educator's completion of the measure, with higher total PLBS scores indicative of more positive learning behaviors. Scores for each of the individual PLBS dimensions were also derived by way of summing all items within each respective domain, which were converted into standardized *T*-scores.

*Reliability and validity of the PLBS.* The technical properties of the PLBS were well supported by the measure's authors, as well as in the results generated from previous studies. McDermott & colleagues (2002), by way of using results derived from the measures' normative sample, reported that all internal consistency values of the PLBS across demographic subgroups; inclusive of age, gender and race; exceed "the .70 criterion and all stability and interobserver agreement coefficients were statistically

significant at  $p < .0001$ ” (p. 359). Results of bivariate and canonical correlations demonstrated evidence of divergent validity between the PLBS Total score, the three PLBS dimensions and the internalizing and externalizing indices of problem behavior, as measured by the SSRS (McDermott et al.). More specifically, the divergence between the PLBS Total score and externalizing problems was statistically significant at  $p < .0001$  ( $r = -.65$ ), while the divergence with internalizing problem behavior was significant at  $p < .001$  ( $r = -.46$ ) (McDermott et al., 2002). Similarly, statistically significant evidence of divergent validity was found among the three PLBS dimensions and externalizing problem behavior, with the Competence Motivation dimension diverging from externalizing problem behavior at the  $p < .001$  level ( $r = -.46$ ), and the Attention/Persistence and Attitude Toward Learning dimensions diverging significantly at  $p < .001$  ( $r = -.69$  and  $r = -.66$ , respectively) (McDermott et al.). Statistically significant divergence has similarly been reported among the three preschool learning behavior dimensions previously listed and internalizing problem behavior, noting correlations of  $r = -.43$  ( $p < .01$ ),  $r = -.32$  ( $p < .05$ ), and  $r = -.46$  ( $p < .001$ ), respectively (McDermott et al.).

The convergent validity of the PLBS has similarly been supported. Relationships between the PLBS Total score, three dimensions of preschool learning behavior and social skills, as measured by the SSRS, were positively correlated at statistically significant levels (McDermott et al., 2002). More precisely, a strong correlation has been found between the PLBS Total score and Self-Control ( $r = .76$ ,  $p < .0001$ ), Interpersonal Skill ( $r = .62$ ,  $p < .0001$ ), and Verbal Assertion ( $r = .41$ ,  $p < .01$ ). The dimension of Competence Motivation was similarly found to converge with the social skill areas of

Self-Control ( $r = .59, p < .0001$ ), Interpersonal Skill ( $r = .50, p < .01$ ), and Verbal Assertion ( $r = .44, p < .001$ ), as was the Attention Persistence dimension ( $r = .76, p < .0001$ ;  $r = .60, p < .0001$ ;  $r = .33, p < .05$ , respectively) and the Attitude Toward Learning dimension ( $r = .76, p < .0001$ ;  $r = .65, p < .0001$ ;  $r = .34, p < .05$ , respectively; McDermott et al.).

Construct validity of the PLBS with “urban, ethnic minority Head Start children” has been demonstrated by Fantuzzo & colleagues (2004, p. 218), who found that the PLBS results with this sample aligned with those of the national sample. The strong convergent and divergent validity of the PLBS, as previously reported, was also supported in this study’s findings. Of importance was the statistically strong convergence with “interactive peer play behaviors at home and at school, dimensions of classroom self-regulation, and assessments of receptive and expressive vocabulary” and similarly powerful indications of divergence with “measures of disruptive and disconnected peer play behaviors at home and school” (Fantuzzo et al., p. 212). The findings of convergent and divergent validity were echoed by Schaefer and colleagues (2004) who found statistically significant positive correlations between learning behaviors and total social skills ( $r = .53$  to  $.63, p < .01$ ), and statistically significant negative correlations with total problem behaviors ( $r = -.47$  to  $-.66, p < .001$ ) as measured by the Preschool and Kindergarten Behavior Scales (PKBS).

#### *Validation Measures*

In order to further validate, as well as provide additional empirical support for the PLBS, considering the limited research that has been conducted with the measure to date, convergent validity was sought between the PLBS and its respective dimensions, and the

Behavior Assessment System for Children-Second Edition (BASC-2) and Devereux Early Childhood Assessment (DECA). As noted previously, the Attention/Persistence subscale of the PLBS is comprised of “items asking about the degree to which children pay attention and are able to persist with difficult tasks” (McWayne, Fantuzzo & McDermott, 2004, p. 635). Accordingly, the Attention Problems subscale items of the Behavior Assessment System for Children–Second Edition, Teacher Rating Scales-Preschool (BASC-2: TRS-P) were utilized (Reynolds & Kamphaus, 2004).

The BASC-2 is a widely used multidimensional evaluation system employed to measure the behavior and self-perceptions of individuals between the ages of 2 and 25 years, with an overall aim of informing and facilitating the “differential diagnosis and educational classification of a variety of emotional and behavioral disorders of children” (Reynolds & Kamphaus, 2004, p. 1). The BASC-2 system is comprised of teacher, parent and child completed protocols, with respondents indicating whether statements are true or false, or the frequency with which outlined behaviors occur (e.g., *never, sometimes, often, always*). However, the preschool version of the measure is comprised solely of parent and teacher responses, considering the age of children in this cohort. While the measure’s authors have provided ample and adequate psychometric data to support the entire TRS-P version of the BASC-2, which in sum consists of 100 items, those of particular importance in the scope of this study, with respect to the validation of the Attention/ Persistence dimension of the PLBS, were the items of the Attention Problems scale. The Attention Problems domain of the teacher rating scale has been defined as “the tendency to be easily distracted and unable to concentrate more than momentarily” (Reynolds & Kamphaus, p. 60). Items specific to the preschool version of this scale



included: “Has a short attention span, listens carefully, listens attentively, listens to directions, is easily distracted, and pays attention” (Reynolds & Kamphaus, p. 98).

BASC-2 clinical scale scores, or those which provide a measure of maladaptive behavior, such as the Attention Problems scale, are divided among five *T*-score categories, with scores equal to or above 70 indicative of clinically significant problems within the domain, those between 60 and 69 indicative of at-risk levels, those falling between 41 and 59 indicating average behavior levels, 31 to 40 indicative of low levels, and those scores below 30 indicating very low levels of problem behavior (Reynolds & Kamphaus).

Both the reliability and validity of the BASC-2: TRS-P Attention Problems scale has been well documented. The authors have reported internal consistency values ranging from  $\alpha = .91$  to  $\alpha = .93$  across 2 to 5 year old children in both gender specific and combined general norm samples, and  $\alpha = .91$  to  $\alpha = .92$  among these groups in clinical norm samples (Reynolds & Kamphaus, 2004). Test-retest reliability of the TRS-P has similarly been reported to be adequate, with reported Attention Problems scale reliability coefficients equal to .83 (Reynolds & Kamphaus). Interrater reliability was also reported to be adequate, with Attention Problems reliability coefficients reported to equal .70. The validity of the Attention Problems scale of the TRS-P has been supported by scale intercorrelation, which demonstrated the degree to which the scale was associated with other scales indicative of the current scientific understanding of the behavioral dimensions of attention problems (Reynolds & Kamphaus). Results of scale intercorrelations indicated that the Attention Problems scale was correlated with the TRS-P Externalizing Problems composite score ( $r = .62$ ), negatively correlated with the Adaptive Skills composite ( $r = -.67$ ), and correlated with the Behavior Symptoms Index

( $r = .76$ ; Reynolds & Kamphaus). Convergent validity for the Attention Problems scale of the TRS-P has also been established with the Attention Problems scale of the Achenbach System of Empirically Based Assessment (ASEBA;  $r = .64$ ), as well as with the Attention Problems scale of the original version of the BASC ( $r = .94$ ; Reynolds & Kamphaus).

In order to validate the Competence Motivation and Attitude Toward Learning dimensions of the PLBS, the Devereux Early Childhood Assessment (DECA) was employed. The DECA (LeBuffe & Naglieri, 1999b) is a standardized, norm-referenced, teacher completed behavioral rating scale used to measure three areas of within-child protective factors, as well as behavioral concerns, of children between the ages of 2 and 5 years. Twenty-seven positive behavior items comprise the three protective factor scales of Initiative, Self-Control, and Attachment. The Behavioral Concerns scale, which serves to evaluate an array of challenging behaviors, is comprised of an additional ten items (LeBuffe & Naglieri). Conversion of the four subscales, after rated as occurring or not occurring within the previous four weeks, yield numerical scores ranging from 0, being indicative of the behavior never occurring, to 4, being indicative of the behavior occurring very frequently. Taken collectively, the DECA yields scale raw scores which are converted to *T*-scores, as well as associated percentile scores, and qualitative descriptions. In addition, summation of the three protective factor raw scores yield an overall Total Protective Factors (TPF) score (LeBuffe & Naglieri). Across all of the protective factors scales, and the derived TPF score, *T*-score classification follow 30-40 as below average, 41-59 as average, 60-70 as above average. Children with higher scores across each of these domains have greater levels of protective factors. *T*-score

interpretation of the Behavioral Concerns scale follows a similar pattern, with higher *T*-scores being indicative of greater overall behavioral concerns (LeBuffe & Naglieri).

The internal consistency of the DECA was reported to be high, with the TPF scale alpha coefficients exceeding .90 (LeBuffe & Naglieri, 1999a). Test-retest reliability of the TPF DECA score was also reported to be high, with correlations of .74 ( $p < .01$ ) for parental ratings, and .94 ( $p < .01$ ) for educator ratings (LeBuffe & Naglieri). Interrater reliability among teachers, as well as parents and teachers were similarly reported to be high, noting reliability coefficients of .69 ( $p < .01$ ) and .29 ( $p < .01$ ), respectively. The authors of the DECA contended that since the measure was the first of its kind, with regards to measuring within-child protective factors, a comparison of the DECA to another well established scale, for the purpose of establishing content-related validity, was not possible. However, the authors stated that in lieu of an extensive literature review, as well as parental and educator focus groups, it was concluded that such technical adequacy existed (LeBuffe & Naglieri). The criterion-related validity of the DECA was established by comparing DECA results between children identified as having an emotional or behavior problem with those from a community sample. Results of this comparison indicated that TPF DECA scores were significantly different between groups ( $p < .01$ ), supporting the validity of the measure (LeBuffe & Naglieri). The construct-validity of the DECA, as determined through use of the TPF score, was also supported; with the authors reporting that data derived from the instrument was consistent with the predictions made from the measure's underlying theory (LeBuffe & Naglieri). More specifically, children with low DECA derived protective factor levels were

determined to have a much greater risk score as determined by summation of two published risk assessment checklists (LeBuffe & Naglieri).

Of particular interest in this study, with regards to the validation of the PLBS dimensions of Competence Motivation and Attitude Toward Learning, were the DECA subscales of Initiative and Self-Control. The Initiative subscale was purported to measure a “child’s ability to use independent thought and action to meet his or her needs” (LeBuffe & Naglieri, 1999b, p. 4). This subscale consists of the 11 items that appeared to align closely with those of the PLBS Competence Motivation dimension discussed previously, and includes the items of: Does things for himself/herself, chose to do a task that was challenging for him/her, participates actively in make believe play with others, keeps trying when is unsuccessful, tries different ways to solve a problem, tries or asks to try new things or activities, starts or organizes play with other children, focuses his/her attention or concentration on a task or activity, says positive things about the future, asks other children to play with him/her, makes decisions for himself/herself (LeBuffe & Naglieri). Reliability of the Initiative subscale has been reported to be strong, with the authors reporting internal consistency estimates of  $\alpha = .84$  for parent raters and  $\alpha = .90$  for teacher raters, test-retest reliability coefficients of  $r = .80$  ( $p < .01$ ) among parent raters and  $r = .91$  ( $p < .01$ ) among teacher raters, and interrater reliability coefficients of  $r = .32$  ( $p < .05$ ),  $r = .59$  ( $p < .01$ ), and  $r = .34$  ( $p < .01$ ) among parent-parent, teacher-teacher, and parent-teacher raters, respectively (LeBuffe & Naglieri). The validity of the Initiative subscale has similarly been reported to be adequate, noting strong criterion as well as construct related validity (LeBuffe & Naglieri).

The Self-Control subscale of the DECA was also of particular interest as a means to validate the PLBS dimension of Attitude Toward Learning as the 8 items of this scale closely aligned with those of the PLBS dimension which focused on concepts such as “children’s willingness to be helped, desire to please the teacher, and ability to cope when frustrated” (McWayne, Fantuzzo, & McDermott, 2004, p. 636). The Self-Control subscale seeks to evaluate a “child’s ability to experience a range of feelings and express them using the words and actions that society considers appropriate” (LeBuffe & Naglieri, 1999b, p. 4). The items that comprise this scale include: Listens to or respects others, controls his/her anger, handles frustration well, shows patience, shares with other children, accepts another choice when her/his first choice unavailable, cooperates with others, calms herself/himself down when upset. Similar to the reliability and validity estimates provided previously for the TPF and Initiative subscale, the Self-Control subscale has been regarded as technically adequate.

#### *Early Childhood Environment Rating Scale-Revised Edition (ECERS-R)*

Early childhood care and education classroom quality was evaluated through the Early Childhood Environment Rating Scale-Revised Edition (ECERS-R). The ECERS-R is an observational tool that has been aligned with DAP (Bredekamp & Copple, 1997) that are embodied in NAEYC’s definition of programmatic quality (Harms, Clifford, & Cryer, 2005). This measure of global quality has assumed an expansive characterization of an early childhood environment to include “those spatial, programmatic and interpersonal features that directly affect the children and adults” (Harms et al., p. 1). In order to gauge these environmental features, as well as subsume the qualitative facets deemed important by NAEYC, the measure’s creators have based the revised scale on

seven distinct subscales, consisting of a total of 43-items and 470 indicators. Each item is rated on a 7-point scale, with the odd number descriptors of *inadequate* (1), *minimal* (3), *good* (5), and *excellent* (7), by an observer who spends a minimum of three hours in each respective classroom (Harms et al.). Scores for each respective subscale, ranging from 1 to 7, are derived by averaging the acquired subscale score by the total number of points possible for a given domain. A total score for the entire classroom is similarly derived from the summation of all accrued ratings and averaged with the total number of points possible, leaving the overall score to fall within a range of 1 to 7.

*ECERS-R subscales.* As stated previously, the ECERS-R consists of seven distinct subscales, which were composed by 43-items. The first is Space and Furnishings, which encompasses the eight items: (a) indoor space, (b) furniture for routine care, play and learning, (c) furnishings for relaxation and comfort, (d) room arrangement for play, (e) space for privacy, (f) child-related display, (g) space for gross motor play, and (h) gross motor equipment (Harms et al., 2005). The reliability of this subscale, as reported by the authors' results of interrater internal consistencies, was found to equal an intraclass correlation of .76 (Harms et al.). Personal Care Routines is the second ECERS-R subscale and is comprised of six items. These items include (a) greeting/departing, (b) meals/snacks, (c) nap/rest, (d) toileting/diapering, (e) health practices, and (f) safety practices. The authors reported that interrater internal consistency was determined to equal .72, by way of intraclass correlations. The third subscale is Language-Reasoning and is comprised of the four items of (a) books and pictures, (b) encouraging children to communicate, (c) using language to develop reasoning skills, and (d) informal use of language

(Harms et al.). Internal consistency reliability coefficients for this subscale were reported to equal .83 (Harms et al.).

The Activities subscale is the fourth ECERS-R subscale and is comprised of 10 items. These items include those that focus on the environmental areas of (a) fine motor skills; (b) art; (c) music and movement; (d) blocks; (e) sand and water; (f) dramatic play; (g) nature and science; (h) math and number; (i) use of television, video and/or computers; and (j) promoting acceptance of diversity (Harms et al., 2005). Reliability coefficients for this subscale were reported to equal .88 (Harms et al.). Interaction and Program Structure are the next two subscales of the ECERS-R, with five items (supervision of gross motor activities, general supervision of children, discipline, staff-child interactions, interactions among children) comprising the former, and four items (schedule, free play, group time, and provisions for children with disabilities) comprising the latter (Harms et al.). Internal consistency reliability coefficients were reported to be adequate for both the Interaction subscale ( $r = .86$ ) and for the Program Structure subscale ( $r = .77$ ) (Harms et al.). Parents and Staff is the final ECERS-R subscale which includes items that assess the (a) provisions made for parents, (b) the provisions made for the personal needs of staff, (c) provisions made for professional needs of staff, (d) level of staff interaction and cooperation, (e) staff supervision and evaluation, and the (f) opportunities for the professional development of program staff members (Harms et al.). The internal consistency reliability of this subscale was reported to equal .70 (Harms et al.)

*Reliability and validity of the ECERS-R.* In reviewing the psychometric properties of the ECERS-R, it is important to note that the measure's authors did not provide

information specific to the validity of the measure (Harms et al., 2005; Paget, 2001; Schwarting, 2004). Rather, the authors stated that the original version of the scale (i.e., ECERS) possessed sufficient predictive validity, and as such it could be assumed that the revision of the measure would retain identical psychometric properties (Harms et al.).

The face and content validity of the ECERS-R was established in that 37 of the 43 ECERS-R items are directly linked to statements of DAP that have been previously reviewed. For example, item #15 of the ECERS-R is concerned with the inclusion of books and pictures in the early learning environment so that children are able to learn about their surrounding world. This item also called for a sufficient number of reading materials to be included and organized in the early childhood environment so that educators could assist children in their exploration and learning through both formal and informal practices. Furthermore, content validity “appear[ed] adequate, as the items address the major criteria by which one would evaluate an early childhood center” (Schwarting, 2001, np), which is expected considering that a panel of early childhood experts, who have been well published in the area, constructed the scale. In order to support the predictive validity of the measure, results of an earlier study (i.e., Peisner-Feinberg & Burchinal, 1997) can be briefly examined, and is that which the authors cite as support for this critical psychometric property. Using the ECERS, statistically significant correlations were observed among six domains of childhood outcomes, inclusive of language scores as measured by the PPVT-R ( $r = .24, p < .001$ ), reading and mathematics scores as measured by the Woodcock Johnson ( $r = .13, p < .001$ ;  $r = .14, p < .001$ , respectively), attention and cognitive skills as measured by the CBI ( $r = .16, p < .001$ ), as well as sociability ( $r = .13, p < .001$ ) and attitudes/perceptions



( $r = .07$ ,  $p < .05$ ) as measured by the CBI (Peisner-Feinberg & Burchinal). The construct validity of the ECERS-R is similarly supported through the extension of previous literature using the original version of the measure (Whitebook, Howes, & Phillips, 1990), in which two factors within the measure were derived: developmentally appropriate activity and appropriate care giving (p. 8).

Authors of the ECERS-R have provided compelling evidence of the measure's interrater reliability and internal consistency reliability, which was derived by way of extensive field-testing. More specifically, the ECERS-R proved reliable at the indicator, item and total score levels across observers (Harms et al., 2005). Across the 470 indicators that comprise the ECERS-R, the percentage of agreement proved to equal 86.1%, "with no item having an indicator agreement level below 70%" (Harms et al., p. 2). At the item level, the authors reported "the proportion of agreement was 48% for exact agreement and 71% for agreement within one point" (Harms et al., p. 2). Across the entire scale, results of Pearson product moment correlations ( $r = .921$ ) and Spearman rank order correlations ( $r = .865$ ), as well as interclass correlations ( $r = .915$ ) proved adequate, further supporting the interrater reliability of the observational tool (Harms et al., 2005). The internal consistency reliability of the ECERS-R was also established by the authors with the internal consistencies of the measure's subscales reported to range from .71 to .88, and the total scale's consistency reliability reported to equal .92 (Harms et al.).

*ECERS-R quality factor structure.* While each of the seven aforementioned ECERS-R subscales were imperative in assessing the global quality of ECCE programs, several studies (viz., Helburn, 1995; Howes, Phillip & Whitebook, 1992; Phillipsen,

Burchinal, Howes, & Cryer, 1997) have taken aim at examining the psychometric structure of the scale to determine if it assessed fewer qualitative aspects. Cassidy and colleagues (2005) explored the factor structure of the ECERS-R using a sample of 1,313 classrooms. Exploratory and confirmatory factor analyses were performed and resulted in a two-factor solution that accounted for 69% of the total item variance (Cassidy, Hestenes, Hegde, Hestenes, & Mims, 2005). The first factor, coined Activities/Materials, consisted of nine ECERS-R items including (a) furnishings for relaxation and comfort ( $r = .65$ ), (b) space for privacy ( $r = .58$ ), (c) books and pictures ( $r = .61$ ), (d) fine motor ( $r = .77$ ), (e) art ( $r = .74$ ), (f) blocks ( $r = .60$ ), (g) dramatic play ( $r = .59$ ), (h) nature/science ( $r = .73$ ), and (i) math/number ( $r = .74$ ; Cassidy et al.). The second factor, Language/Interactions, consisted of seven ECERS items including (a) using language to develop reasoning skills ( $r = .47$ ), (b) informal use of language ( $r = .63$ ), (c) general supervision of children ( $r = .54$ ), (d) discipline ( $r = .78$ ), (e) staff-child interactions ( $r = .72$ ), (f) interactions among children ( $r = .72$ ), and (g) group time ( $r = .48$ ; Cassidy et al.) The authors further indicated that this 16-item abbreviated scale correlated highly with the overall scale ( $r = .90$ ), accurately reflected “two widely held constructs of quality: Activities/Materials and Language/Interactions”, and was “a relatively good proxy for scores on the full scale” (Cassidy et al., p. 357).

#### *Basic School Skills Inventory-Third Edition (BSSI-3)*

Early academic skills and school readiness was measured by the Basic School Skills Inventory-Third Edition (BSSI-3; Hammill, Leigh, Pearson, & Maddox, 1998). The BSSI-3 is a standardized, norm-referenced teacher completed inventory that is based on an educator’s judgment of desirable school performance of children between the ages

of 4 years, 0 months and 8 years, 11 months. The measure is grounded in the importance of a teacher's expertise in assessing children's progress and the necessity of recognizing particular skill sets that are required for school readiness (Hammill et al.). A total of 137 items comprise the BSSI-3. These items are grouped into six subtests and rated by each child's respective educator or other observer on a 4-point Likert scale ranging from 0 to 3, indicating that the child *does not perform* the indicated item, to *mastery*, respectively (Hammill et al.). The six subscales that comprise the BSSI-3 are: Spoken Language, Reading, Writing, Mathematics, Classroom Behavior, and Daily Living Skills. Completion of the 137-item, BSSI-3 inventory yielded raw scores for each of the aforementioned subtests, which were converted into age appropriate percentiles and standard scores. Each of the subtest standard scores range from 1 to 20, with a score falling between 8 and 12 being indicative of average skill level. Summation of these subtest standard scores derived an Overall Skill Level composite score, which was considered indicative of a child's school readiness (Hammill et al.). Overall Skill Level composite scores falling between 90 and 109 were considered to be average, while those composite scores above 130 were considered very superior and those below 70 deemed very poor (Hammill et al.).

*Technical adequacy of the BSSI-3 Overall Skill Level composite.* The authors of the BSSI-3 reported high reliability and validity for the measure as a whole, as reflected by the measures Overall Skill Level composite. More specifically, internal consistency reliability reflected strong homogeneity among test items, with coefficient alphas for the Overall Skill Level composite reported to equal .98 across 4 to 8 year old age intervals (Hammill et al., 1998). Among selected subgroups of children; including Caucasians,

African-Americans, Hispanics, English as Second Language students, males, females, and those with developmental delays; internal consistency reliability was similarly strong, with all reported Overall Skill Level alphas equal to or greater than .95 (Hammill et al.). Stability reliability was also evaluated on the Overall Skill Level composite and was determined to be adequate, with the test-retest reliability coefficient equal to .99 (Hammill et al.). Interscorer reliability of the BSSI-3 Overall Skill Level composite was also reported to be strong ( $\alpha = .97$ ; Hammill et al.).

In addition to the reliability coefficients provided by the authors, Hammill and colleagues (1998) also provided strong evidence for the content, criterion-related and construct validity of the measure. Results of an item analysis with the items retained from the instrument's experimental version, which met item difficulty criteria  $r = .3$  to ensure discriminating power, indicated that the test items satisfied the established requirements for quantitative content validity (Hammill et al.). Moreover, the authors reported the follow-up results of a differential item functioning analysis, which found minimal or nonexistent item bias among three dichotomous subgroups across all subtests ( $r \geq .85$ ; Hammill et al.). The qualitative content or face validity of the measure has also been supported by the authors in the construction of a measure that serves to quantify an educator's observation of student skills and authentic behaviors by way of utilizing the information derived from activities such as "daily class work, informal assessment, direct observation, and instructional interactions" (Hammill et al., p. 42).

The concurrent validity of the BSSI-3 was established by way of correlating the inventory's language subtests (i.e., Spoken Language, Reading, and Writing) to the Rhode Island Test of Language Structure (RITLS) and the EOWPVT-2 (Hammill et al.,

1998). Results of this correlative procedure indicated that the Spoken Language, Reading and Writing subtests were correlated with the RITLS ( $r = .87, .54$  &  $.44$ , respectively) a measure which assessed one's comprehension of syntax, and the EOWPVT-2 ( $r = .46, .37$ , and  $.65$  respectively), which measured expressive vocabulary (Hammill et al.). These results were indicative of a moderate to high relationship between these measures and the BSSI-3, and substantiated the measure's concurrent validity (Hammill et al.). The construct identification validity of the measure has also been reported to be relatively strong as the result of several correlative procedures that demonstrated strong correlations between the BSSI-3 and age, moderate median correlation with self-help and social skills measures (median  $r = .55$ ), moderate median correlation with measures of general knowledge (median  $r = .55$ ), the ability to differentiate between groups with and without disabilities, as well as adequate item validity (Hammill et al.).

*Psychometric Properties of the BSSI-3 subtests.* The Spoken Language subtest consists of 26 items that were designed to gauge a child's oral language ability (Hammill et al., 1998). According to the authors, the items incorporated in this subtest align with linguistic abilities in the areas of phonology, morphology, syntax, semantics, and pragmatism (Hammill et al.). Internal consistency reliability estimates for this subtest have been reported to be equal to or greater than  $.96$  across the five age intervals sampled,  $.97$  or greater across the selected subgroups previously mentioned, test-retest reliability equal to  $.99$ , and interscorer agreement of  $.96$  (Hammill et al.).

The second BSSI-3 subtest, Reading, consists of 24 items that were designed to measure a child's understanding of print that occurs "in the form of letters, words, sentences, and paragraphs" (Hammill et al., 1998, p. 4). The inventory accomplishes this

by way of assessing the related reading abilities of “letter-knowledge, sound-symbol relationships, sight word recognition, use of grammatical cue systems, ability to predict words from context, and comprehension of main ideas in stories” (Hammill et al., p. 4). The average internal reliability estimate of this subtest was determined to be adequate across the five age intervals ( $\alpha = .93$ ). However, the derived internal consistency reliability among the four-year-old age cohort was determined to equal .70 (Hammill et al.). Internal consistency reliability was also determined to be strong ( $\alpha \geq .94$ ) across all selected subgroups with the exception of those children with developmental delays ( $\alpha = .75$ ) (Hammill et al.). Test-retest reliability, as well as interscorer reliability of the Reading subtest was determined to be adequate, citing an alpha coefficient equal to .99 for both reliability types (Hammill et al.).

Ability and skill in the domain of written expression was assessed by the Writing subtest. The 20 items that comprise this subtest measure a child’s capability to write letters, words, and sentences (Hammill et al., 1998). The subtest also enables a child’s educator to evaluate more discrete functions of written expression, by having the child engage in writing processes, inclusive of the copying and writing of dictated words and sentences, spelling, capitalization, punctuation, as well as purposeful writing skill (Hammill et al.). The reliability of items among this subtest was strong across the five age intervals, with the lowest coefficients ( $\alpha = .91$ ) appearing among the 7 and 8 year old age groups (Hammill et al.). Amongst selected subgroups based on gender, race, English as a Second Language (ESL) and those with developmental delays, it was determined that the Writing subtest maintained a high level of internal consistency reliability ( $\alpha \geq .93$ ) across all subgroups, except among those experiencing developmental delays ( $\alpha = .26$ ) as

many of these children failed to correctly complete any of the items (Hammill et al.). Results attested to by the authors further affirm the constancy of this subtest, noting that the test remained stable over time ( $\alpha = .98$ ), as well as across different observers ( $\alpha = .96$ ).

Mathematics serves as the fourth subtest and provides a measure of a child's numerical concept and operations knowledge (Hammill et al., 1998). The 20 items that comprise this subtest assess the components of successful elementary school mathematics performance inclusive of "the recognition and printing of numerals, counting, quantitative relationships, equivalence, seriation, and simple arithmetic computations" (Hammill et al., p. 4). Reliability of these subtest items proved to be in concert with the results of the subtests reviewed previously, noting strong internal consistency reliability across all age and subgroups ( $\alpha \geq .90$ ), across time of administration ( $\alpha = .96$ ), as well as across observers ( $\alpha = .95$ ).

Although not utilized in the present study, two additional subscales comprise the BSSI-3. The first is Classroom Behavior, which serves as the fifth BSSI-3 subtest and was included in the measure in light of the deleterious effects that behavioral deficiencies can have on later academic progress. The 23 items that comprise this subscale focus on the assessment of behaviors aligned with a child's ability to sustain attention, cooperate with peers and others across activities, his or her attitude toward class work, their ability and willingness to socialize, as well as his or her work habits (Hammill et al., 1998). Hammill and colleagues reported high levels of reliability for this subtest as well. More specifically, results indicated that across 4 to 8 year old children, internal consistency reliability coefficients were equal to or greater than .97, averaging .97 for all five of the

groups (Hammill et al.). Similar internal consistency results were noted for selected subgroups of children, with all group reliability estimates equal to or above .96, with the exception of those children experiencing developmental disabilities ( $\alpha = .90$ ).

The final subtest included in the BSSI-3 is Daily Living Skills, and serves to evaluate the knowledge and skills fundamental in a child's participation in school related activities (Hammill et al., 1998). This subtest's 24 items assess a child's fine motor ability, self-care behaviors, as well as the behaviors that are required for independent functioning (Hammill et al.). Moreover, this scale seeks to assess a child's basic knowledge base through items related to time and days of the week, as well as those items that reflect a child's exposure through experience with or influence of parents and caregivers (Hammill et al.). The technical adequacy of the Daily Living Skills subtest was supported by the authors who cited internal reliability consistency coefficients of .83 or greater across ages groups and .91 or greater among those from various racial, gender, language and disability subgroups (Hammill et al.). The reported test-retest reliability coefficient were similarly strong ( $\alpha = .96$ ), as were the reported interobserver results ( $\alpha = .96$ ).

### Research Design

The research design of this study was correlational in nature. The correlational research method was employed as the primary goal of this study was to collect and analyze data related to preschool learning behaviors and basic academic skills of young children attending ECCE programs of high, medium and low quality, in order to determine the nature of relationships among ECCE program quality, learning behavior and basic academic or school readiness skills. In light of the research questions, this



correlational research method assumed both relational and predictive forms in that the purpose of this study was to explore the relationship between the aforementioned variables (relational), as well as seek to determine which of the ECCE quality factors best predicted preschool learning behaviors (predictive). Considering that correlation research design does not attempt to determine cause-and-effect relationships among variables, but rather serves to determine if an association exists between variables, and what the nature of the particular association is, the threats to the internal and external validity of this design were minimal (Martella, Nelson, & Marchand-Martella, 1999). However, attention was given to the minimum sample size to ensure variability amongst scores and the inclusion of an adequate sample of early childhood classrooms and children from these respective programs.

*Independent & dependent variables.* The independent variables of this study were the levels of ECCE program quality. Program quality categorization (i.e., low, medium, high) was determined through the use of the ECERS-R, with total and subscale scores ranging from 1 (*low quality*) to 7 (*high quality*). Program quality categorization was based on the total ECERS-R scores used in previous research (viz., Howes & Smith, 1995), with scores less than 3 being indicative of poor quality, scores falling between 3.01 and 4.99 indicative of medium quality, and total scores greater than 5 being indicative of high quality. Additionally, 16 ECERS-R quality predictor variables were utilized in the present study. As previously reviewed, these 16 items have been shown (see Cassidy et al., 2005) to comprise two distinct ECERS-R quality factors: Activities/Materials (9 items) and Language/Interaction (7 items).

The criterion variables of this study included the total score derived from the PLBS, which was indicative of a young child's overall learning behavior. Also, early academic performance and school readiness were determined through four (i.e., Spoken Language, Reading, Writing and Mathematics) of the six subtest scores of the BSSI-3, with higher subtest scores being indicative of greater overall early academic performance. Considering the age range of participants, subtest standard scores were not available for the Writing subtest. As such, raw scores were used. Additionally, a total score for the BSSI-3 was derived from the summation of the standard scores from three of the subtests (i.e., Spoken Language, Reading, and Mathematics).

#### Procedures

Upon receiving research approval from the Duquesne University Human Subjects Institutional Review Board (IRB), 585 ECCE facilities in 17 Western Pennsylvania counties were identified. Program identification was completed using each program's NAEYC accreditation status and Keystone STARS status. Following site identification, the primary investigator sent one letter to each facility explaining the nature of the research study, along with a request for participation. Of the 585 sites targeted, a total of 11 facilities agreed to participate in the study. Once site approval had been secured, the primary researcher went to each facility and worked with site staff to recruit children between the ages of 4 and 5 years, 11 months. This was accomplished by obtaining the written informed consent from each child's parent or guardian, in accordance with the standards put forth by the University's review board and the ethics for human subject research put forth by the American Psychological Association (APA).

Following a lengthy recruitment period, the ECERS-R was completed in each classroom, based on a minimum of three hours of direct observation, in order to obtain the information necessary in determining each classroom's level of programmatic quality. The primary researcher completed each program evaluation, with the initial eight evaluations completed with an assistant scorer. The assistant scorer was a doctoral student in the Duquesne University School Psychology Program, who received adequate training in the use of the ECERS-R. For the initial eight ECCE programs that were evaluated by the primary investigator and the assistant scorer, interrater agreement was calculated. For the purpose of this study, in accordance with the method used to calculate interrater agreement as recommended by the authors of the ECERS-R and utilized in previous research (see Cassidy et al., 2005), interrater agreement was calculated by summing the total number of item agreements within one point (e.g., scores of 6 and 7 were considered an agreement) and dividing this by the total number of items. Results indicated that interrater agreement across these eight classrooms ranged from 83.3% to 97.6%, with an average overall agreement equaling 89.85%. For those ECERS-R items that the primary researcher and assistant scorer disagreed upon (i.e., score differences greater than 1 point) the average of the two scores were used.

Upon completing the ECERS-R in each classroom, lead classroom educators were provided with a research packet for each participating child. All packets included a PLBS, the Attention Problems subscale items from the BASC-2, and the DECA, as well detailed instructions regarding completion and handling of the instruments. Instruments included in each research packet were void of identifiable information other than a

numerical code, which was only known by the primary researcher and the child's educator.

When the PLBS, BASC-2 Attention Problems subscale items, and DECA were completed, the educator was instructed to place the materials into a provided clasp envelope. Educators were further instructed to store these materials in a secure and private location, to ensure each child's confidentiality, until the materials could be procured by the primary researcher. Upon receipt of the materials, the primary researcher secured the data in a private location, in order to maintain the confidentiality of the information. Once the measures were received, the primary researcher returned to each ECCE classroom and observed each participating child to complete the BSSI-3. The researcher also consulted with the child's classroom teacher following these observation periods to ensure the accuracy of ratings. Following the completion of the BSSI-3, and assurance that all materials had been returned, the primary researcher provided each participating preschool program with a detailed quality report based on the ECERS-R ratings obtained through participation in the study.

### Data Analysis

This study investigated the relationship between preschool learning behaviors, ECCE center quality, and the academic achievement of preschool aged children (i.e., 4 years to 5 years, 11 months). Specifically, this study examined the following research questions.

#### *Assumptions and data analysis of research question one*

The first research question analyzed was whether the items of the PLBS yielded robust dimensions of learning behavior for the sample of preschool children. It was

hypothesized that the items would load among the three distinct learning behavior dimensions of Competence Motivation, Attention/Persistence, and Attitude Toward Learning. To evaluate this question, a confirmatory factor analysis (CFA) was completed as CFA indicates which variables load on particular factors (Stevens, 2002). This analysis allowed for a determination to be made as to whether the 24 PLBS items, and the factor solution, conformed to what was previously published for the measure.

The use of CFA required that there was a strong theoretical and/or empirical basis for the procedure (Stevens). Previous research (viz., Fantuzzo et al., 2004 & McDermott et al., 2002) provided the empirical base to support the use of this statistical procedure. CFA also required that the number of factors be fixed a priori (Stevens). Considering the three-factor structure of the PLBS, as found in previous research, it was hypothesized that the PLBS items would load among these factors in a manner similar to that previously derived. A principal axis factoring (PAF) method was applied, as this method allowed for the examination of variables (i.e., PLBS items) in order to determine if they would load among the three factors hypothesized. To determine how well the model fit the variables, an examination of the “overall size of the fitted residuals it produce[d]” or the “degree of correspondence between the interrelationships predicted by the model and the interrelationships actually observed” was completed by evaluating the residuals (Bryant & Yarnold, 1995, p. 111). Residuals that were closer to zero were indicative of a better model fit (Bryant & Yarnold). Additionally, the generated chi-square and associated *p*-value were assessed to determine the appropriateness of the model. By examining the chi-square, “which indicates the probability that the matrix of fitted residuals generated by the model is different from zero,” it was possible to determine if the model was

appropriate (Bryant & Yarnold, p. 111). If the residuals were significantly different from zero, a statistically significant  $p$ -value would be noted, and as such the model would have failed to be precise in its reproduction of data (Bryant & Yarnold). It was determined that if the results of this analysis did not support the structure of the PLBS, an exploratory factor analysis (EFA) would be conducted. This statistical procedure sought to determine the factor structure for a set of variables by way of indicating the number of factors that existed as well as the distinct nature of factor loadings (Stevens, 2002).

#### *Data analysis for research question two*

The second research question examined whether the dimensions of learning behavior were validated by other measures. It was hypothesized that each of the learning behavior dimensions would be validated by additional measures demonstrated to assess similar competencies. In order to evaluate the convergence of the three PLBS dimensions with other measures, a simple bivariate correlation matrix was derived between the learning behavior dimensions and children's competencies. More specifically, the three PLBS dimensions were correlated with the Attention Problems subscale items of the BASC-2, as well as with the Initiative and Self-Control subscales of the DECA. It was determined that convergent validity would be assumed if statistically significant correlations were found between the PLBS Attention/Persistence subscale and the BASC-2 Attention Problems subscale, the PLBS Competence Motivation subscale and the Initiative subscale of the DECA, and the Attitude Toward Learning subscale of the PLBS and the Self-Control subscale of the DECA (see pp. 117-119 for a complete explanation).

*Assumptions and data analysis for research question three*

The third research question served to analyze whether children who experienced different levels of overall early childhood classroom quality significantly differed in overall preschool learning behavior. It was hypothesized that children experiencing lower program quality conditions would differ significantly in preschool learning behavior from those participating in higher quality programs as children in higher quality programs would demonstrate significantly stronger positive learning behaviors.

To determine if a statistically significant difference existed between the preschool learning behaviors of children from high, medium and low quality preschool classrooms, a univariate ANOVA was calculated. Specifically, the ANOVA was used as it provided a measure of the mean differences between the three groups. In this case, the three groups were children in high, medium and low quality ECCE classrooms, as determined by the overall ECERS-R score, and the comparison of the mean overall learning behavior scores of each group, as determined by the PLBS. The significance level for this analysis of variance was set at  $\alpha = .05$ .

Considering that children were placed in either a high, medium or low ECCE program quality condition, and in light of the children being part of identical classrooms, a mixed effects model was used to determine if any significance noted in the ANOVA was truly the result of learning behavior differences among quality groups, or due to the effect of multiple children being associated with identical classroom quality scores. If the results of this initial analysis proved significant, that is significance of the fixed factor (i.e., quality groups) and nonsignificance of the random factor (i.e., individual classrooms), it would be determined that the results indicated a statistically significant

difference in learning behavior among quality groups. If such a result was found, then a one-way ANOVA would be computed to remove the effect of the individual classroom. Further, if both the fixed quality group and random classroom effects were significant, then the findings would indicate that quality group learning behavior differences did exist, and similarly a one-way ANOVA would be computed. However, if the results across both factors proved to be nonsignificant, then the findings would have indicated that no statistically significant differences existed.

Three assumptions underlying the use of a univariate ANOVA were of importance. The first was the assumption of normality, which contended that the samples used to obtain data were drawn from populations that were normally distributed (Kerlinger & Lee, 2000; Wood, 1974), and that the scores obtained from each of the population groups were normally distributed around the group means. The second assumption of ANOVA was that of independence of observations, which is critical to be met in both parametric and nonparametric statistics. This assumption required that the groups from which data was obtained were comprised of separate individuals so that the data or observations were independent of one another and that one observation did not impact another observation (Kerlinger & Lee). Homogeneity of variance was the final assumption underlying the ANOVA and assumed that statistically, the observed variance between the groups was equal to one another (Kerlinger & Lee).

To evaluate the aforementioned normality assumption, both the plots and graphs generated by the Statistics Package for the Social Sciences (SPSS) 14.0, were examined. More specifically, stem-and-leaf plots and histograms were examined to determine if data was skewed. Normal Q-Q plots, as generated by SPSS, were analyzed to determine if



data points clustered around the reference line, which would be an indication of the normality assumption being met. Further, detrended normal Q-Q plots were examined for similar relationships. Box plots were also examined to determine the symmetry of data points, as well as to determine if the distribution of data was skewed or possessed extreme values.

The Shapiro-Wilk's test was conducted to test the normality of the data. This statistical procedure allowed for the evaluation of "the null hypothesis that the data [was] a sample from a normal distribution" (Norusis, 2002, p. 258). If the observed significance levels of the Shapiro-Wilk's test for normality were small, it would be assumed that the data for the distribution was normal and that the assumption was met (Norsuis). Should this assumption have been proved to be violated due to skewness in the distribution, it would not be of great concern as such a violation only has a "slight effect on power" (Stevens, 1999, p. 75). Should this violation have been the result of platykurtic distribution of scores, however, the results could significantly affect the power of the analysis, particularly if the data was obtained from a small sample size (Stevens). As long as the sample size of the present study was not small or highly skewed, any violation of this assumption would have negligible consequences on both types of potential error: Type I & Type II error.

The second assumption was that of the independence of observations. To evaluate this assumption or the degree to which observations were in fact independent of one another, both logical and empirical methods were utilized. Considering that one PLBS was completed on each child by his or her respective lead classroom teacher, and that children within and between groups were not paired, it was assumed that the individual

scores of one child did not effect the scores of another. Empirically, the Durbin-Watson coefficient ( $D$ ) was calculated as it provided a measure of the serial correlations amongst variables (Myers & Well, 2003).  $D$  statistics ranged from 0 to 4, with values closer to  $D = 0$  being indicative of strong positive correlations, and a value close to  $D = 4$  being indicative of a strong negative correlation, both of which may have indicated a violation of the independence assumption (Myers & Wells). Ideally, Durbin-Watson coefficient scores should range from  $D = 1.5$  to  $2.5$ , which indicates that the independence assumption is satisfied (Norusis, 2002).

To evaluate the third assumption underlying the  $F$  test, the homogeneity of variance assumption, several steps and procedures were undertaken. Initially, each group's respective sample size was evaluated to determine if the design was balanced. If such a determination was made, then the likelihood of variances being unequal between the groups would be small as the  $F$  test is generally robust to violations of this assumption. However, should the sample sizes have been of unequal size, concern would be placed on potential violation of this assumption as it could have resulted in a greater risk of type I error, particularly if the larger sample was that with the smallest variance. In order to evaluate this assumption, Levene's Test of Homogeneity of Variances was conducted in SPSS as it evaluated the equality of group variances (SPSS Base User's Guide, 1999b). Should this assumption have been violated, meaning that the variances between groups were unequal to a level of statistical significance, additional procedures would have been performed as warranted. Specifically, a variance-stabilizing data transformation could have been performed, or a Welch or Brown-Forsythe ANOVA modification (Myers & Wells, 2003).

#### *Assumptions and data analysis for research question four*

The fourth research question examined whether children who experienced different levels of ECCE quality significantly differed across the three preschool learning behavior dimensions. It was hypothesized that children exposed to higher quality ECCE environments would have significantly stronger preschool learning behaviors across the three dimensions than those exposed to lower quality programs.

To evaluate this research question, a one-way Multivariate Analysis of Variance (MANOVA) was conducted as there was one categorical independent variable (i.e., ECCE quality) and three dependent variables (i.e., Competence Motivation, Attention/Persistence, Attitude Toward Learning). An alpha level equal to .05 was utilized as the significance level in the analysis.

For this MANOVA, three assumptions were evaluated. The first assumption was that of multivariate normality, which assumed that all the individual dependent variables were distributed normally. Also, any linear combination of the dependent variables would also be normally distributed. Finally, this assumption stated that all subsets of the variables would have a multivariate normal distribution (Stevens, 2002). In order to test this assumption, the normal probability plot was examined to determine if the plot resembled a straight line, indicating that normality was tenable. An examination of the histogram and stem-and-leaf plot of the variable in each group was also undertaken to determine if the normality assumption had been violated. The chi-square goodness of fit, Kolmogorov-Smirnov test, the Shapiro-Wilks test, and the skewness and kurtosis coefficients, all of which were computed by SPSS, were analyzed to determine if the multivariate normality assumption had been violated.

The second assumption of MANOVA was that of homogeneity of covariance matrices. In essence, MANOVA required that the covariance, or the variance shared between two variables, for all unique pairs of dependent measures was equal for all experimental groups (Stevens, 2002). To test this assumption, the Box Test for Equality of Covariance Matrices was utilized. It must be noted that if the design was balanced, so that there was an equal number of observations in each cell, the robustness of the MANOVA tests were guaranteed. However, if the design was unbalanced, using the Box's M test was an appropriate choice. If the Box's M test was significant at less than  $p = .001$ , there would be cause for concern, as a severe distortion in the alpha level of the tests could potentially exist.

The third assumption of MANOVA was independence of observations. This assumption stated that a subject's score on the dependent measures were not influenced by the other subjects in his or her group (Stevens, 2002). Considering that scores derived from the teacher completed PLBS for one child in no way influenced the results of another child, it may be assumed that this assumption would be met. If it was suspected, however, that the nature of this study would result in correlated observations, the test would be conducted at a more stringent level of significance.

#### *Assumption and data analysis for research question five*

This research question sought to determine which of the 16 ECCE quality factors identified by Cassidy and colleagues (2005) were predictive of overall preschool learning behavior. It was hypothesized that those items from ECERS-R subscales that were aligned with developmentally appropriate instructional and learning practices

(i.e., Language-Reasoning, Activities, Interactions and Program Structure) would be the greatest predictors of preschool learning behavior.

To determine which of the ECCE quality factors, as determined by the 16 quality items comprising the ECERS-R factors of Activities/Materials and Language/Interaction, as proposed by Cassidy and colleagues (2005), were related to the preschool learning behaviors, a multiple regression analysis was employed. This analysis allowed for the prediction of the dependent variable of learning behavior from the predictor or independent variables of ECCE quality (Stevens, 1999). It allowed for the determination of which of the quality factors explained a significant proportion of the variance in learning behavior. In order to determine which ECCE quality variables were the most significant predictors of preschool learning behavior, each predictor variable was entered into a multiple linear regression using the enter method as such a method enters all specified variables in a single step of decreasing tolerance. As a result, a model was generated from the predictors that accounted for the greatest amount of unique variance. An *F*-test, with a significance level of  $\alpha = .05$ , was then completed in order to determine if the regression model was in fact statistically significant.

Several assumptions underlie the use of a multiple regression analysis. First, the normality assumption had to be met. This assumption assumed that the residuals were normally distributed around the predicted dependent variable scores, which was assessed by way of examining residual scatterplots and a histogram of standardized residuals as generated by SPSS (Stevens, 2002). Second, it was required that the assumption of linearity be met, meaning that the residuals formed a relationship with predicted dependent variable scores as indicated by the random scatter of the residuals around a

horizontal line as depicted in a residual plot of standardized residuals versus predicted values (Stevens). The assumption of homoscedasticity, the third assumption underlying multiple regression, was also evaluated. This required that the standard deviations of errors of prediction were approximately equal for all dependent variable measures (Licht, 2000). This assumption was examined by way of residual plots. If the assumption was met, the points of the residual plot would have scattered evenly around the horizontal line on the graph which would have indicated the mean of the residuals. Finally, another assumption of importance was the independence of observations, which indicated that the value of one observation was not related to that of another (Norusis, 2002). This assumption of regression was evaluated by calculating the Durbin-Watson coefficient, which assessed whether “adjacent observations [were] correlated” (Norusis, p. 22). If the successive residuals did not demonstrate correlations between one another, the coefficient would fall between 1.5 and 2.5 (Norusis). Considering that a small number of extreme cases could have a significant impact on the results of this regression model, a series of procedures were employed to identify those influential data points.

Outliers or extreme scores could have greatly impacted the normality of the sample data. As such, procedures were utilized to minimize the effects those data points might have had on the results and the probability of committing a type I or II error. In order to determine if outliers existed in the data, several methods were utilized. Values for the Mahalanobis distance, centralized leverage, and the Cook’s D were computed for each case in SPSS. Standardized dfbeta values for each case, as well as normal Q-Q plots, histograms, and a scatterplot were derived as well. The derivation of these values and plots allowed for the comparison of each of the aforementioned scores with respective

cut-off values to determine if the scores were extreme in nature. More specifically, for the Mahalanobis distance, a cut-off value from the *Percentile Points for  $X^2$  Distribution* table was selected which corresponded with an alpha level of .001. By using this cut-off value and comparing it to each of the case values, a determination was made as to whether the case value was greater than the Mahalanobis distance, which is a measure of the distance of a case from the average values of all of the independent variables. For Cook's D, the statistic has a cut-off value of  $>1$ , and is a measure of how much the residuals of all cases would change if the current case were omitted from the calculations. A comparison of each case's Cook's D statistic was made to this standard in order to determine if any values were in violation (Stevens, 2002).

For centralized leverage values, a comparison was made for each of the case values to the cut-off value, which has been generally accepted to be  $>3p/n$ , where  $p$  is equal to  $k + 1$ , in order to determine how greatly each case influenced the fit of the regression model (Stevens, 2002). For standardized dfbeta values, an examination of the generated boxplots and stem-and-leaf plots was conducted to determine if any of the cases demonstrated an influence on the individual standardized dfbetas, which was further supported by way of examining the extreme cases table generated via SPSS. In addition, the histogram, normal Q-Q plot, and the scatterplot were analyzed. By way of examining the histogram, it was possible to determine if the distribution was normal or was being skewed by an extreme case(s). Examination of the normal Q-Q plot of regression statistics was also conducted to evaluate the degree to which scores deviated from a straight line, which could have indicated that possibly some identified values were impacting the normality assumption. The scatterplot was also reviewed as it served to

provide evidence regarding the normality assumptions, as well as allowed for the evaluation of extreme cases.

*Assumptions and data analysis for research question six*

The sixth research question explored whether children who experienced different levels of overall early childhood classroom quality significantly differed in early academic skills. It was hypothesized that statistically significant differences in overall early academic achievement would emerge between children participating in high, medium and low quality early educational environments.

For the purpose of determining whether statistically significant differences existed in the early academic achievement scores of children who experienced different levels of ECCE quality, a univariate ANOVA was calculated. More specifically, the differences in mean achievement scores, as determined by the summation of standard scores for three of the academic achievement subtests of the BSSI-3 (i.e., Spoken Language, Reading, and Mathematics), were compared between the three classroom quality groups, as determined by the overall ECERS-R score. A mixed effects model was utilized, and discussed previously. The assumptions underlying the univariate ANOVA, as well as the ways in which these assumptions were assessed, were outlined previously (see pp. 136-140).

*Assumptions and data analysis for research question seven*

Whether children who experienced different levels of overall early childhood classroom quality differed significantly across each of the four areas of early academic skills was the focus of the seventh research question. It was hypothesized that statistically significant differences in early academic achievement would emerge across each of the four achievement areas, with those children experiencing higher preschool quality



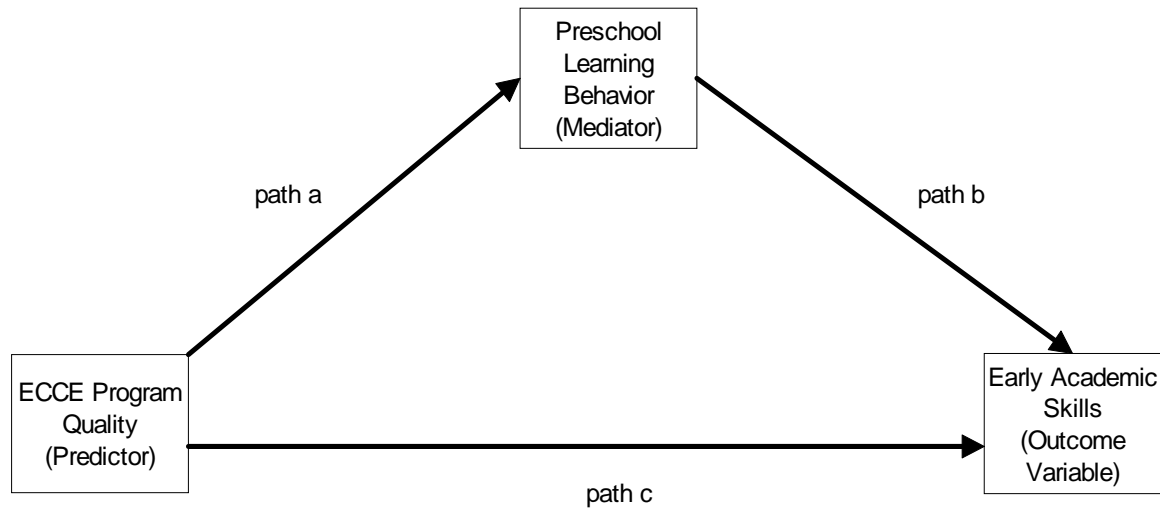
demonstrating stronger achievement across each domain when compared to their medium and low ECCE program quality counterparts.

In order to evaluate this research question, a one-way MANOVA was conducted as there was one categorical independent variable (i.e., ECCE quality) and four dependent variables (i.e., early academic achievement across four areas: Reading, Mathematics, Writing, Spoken Language). An alpha level equal to .05 was utilized as the significance level in this analysis. The assumptions underlying the use of a MANOVA, and manner in which these assumptions were evaluated, have been outlined previously (see pp. 140-142).

#### *Assumptions and data analysis for research question eight*

The eighth and final research question explored in this study sought to determine whether the effect of ECCE program quality on early academic skill level was mediated by preschool learning behavior. It was hypothesized that learning behavior would have a mediating effect such that the relationship between program quality and early academic skill development would be reduced by the impact of preschool learning behavior.

The hypothesized mediation model is as follows:



The above mediation model depicts a three variable system, as described by Baron and Kenny (1986), in which there are two causal paths to reach the outcome variable of early academic skills. The first path (i.e., Path *c*), depicts the direct impact of the predictor variable (i.e., ECCE program quality) on the outcome variable (i.e., early academic skills). Path *b*, depicts the impact of the preschool learning behavior mediator variable on the early academic skills outcome variable. While the third path, Path *a*, depicts the relationship between the predictor variable (i.e., ECCE program quality) and the mediator (i.e., preschool learning behavior). According to Baron and Kenny, a variable, such as preschool learning behavior, serves “as a mediator when it meets the following conditions: (a) variations in levels of the independent variable significantly account for variations in the presumed mediator (i.e., Path *a*), (b) variations in the mediator significantly account for variations in the dependent variable (i.e., Path *b*), and (c) when Path *a* and *b* are controlled, a previously significant relation between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path *c* is zero” (p. 1176).

In order to test and measure this mediational model and estimate the paths, multiple regression analyses were used. Three steps have been proposed by Baron and Kenny (1986) and Judd and Kenny (1981) to evaluate such a mediational model. First, it was essential to establish whether there was an effect between the independent variable (i.e., ECCE program quality) and the outcome (i.e., early academic skill) that could be mediated. In order to determine this, the outcome variable was regressed on the independent variable. Second, it was necessary to demonstrate whether the independent variable of ECCE program quality was correlated with the proposed preschool learning behavior mediator variable. As such, the mediator was regressed on the independent variable. A third step in testing this model was to evaluate Path *b*. In order to do so, the dependent variable was regressed on both the independent variable and mediator. As explained by Baron and Kenny, performing such regression analyses served to test the paths between variables, however in order to establish mediation, several additional conditions must hold true. First, the “independent variable must be shown to affect the dependent variable;” second, “the independent variable must affect the mediator” in the second equation; “and third, the mediator must affect the dependent variable in the third equation” (Baron & Kenny, p. 1177). Moreover, “if these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than” in the first, with the determination of perfect mediation “if the independent variable has no effect when the mediator is controlled” (Baron & Kenny, p. 1177). If the above conditions were met, than the Sobel method would have been utilized to test the significance “for the indirect effect of the

independent variable on the dependent variable via the mediator (Baron & Kenny, p. 1177).

## CHAPTER IV

### RESULTS

#### Descriptive Analysis

A total of 123 preschool aged children, from 11 preschool classrooms, participated in the present study. Participants ranged in age from 48 to 71 months ( $M = 57.43$ ), with 52 (42.3%) reported as male and 71 (57.7%) female. Of the 11 preschools, overall ECERS-R scores ranged from 2.476 to 6.821 ( $M = 4.454$ ) with four determined to be of low quality, four as medium quality, and three classrooms as high quality. Table 1 summarizes this participant information, inclusive of the mean participant age and quality group composition by sex. Table 2 summarizes the total ECERS-R scores for each of the 11 classrooms, and the mean ECERS-R score for each group.

A chi-square test of association was completed in order to determine if the sex of the participants were significantly associated with any of the preschool quality classrooms. The results indicated that the sex of the study's participants were not associated with any one quality condition more than another ( $\chi^2(2) = 2.465, p > .292$ ). A one-way ANOVA was also computed in order to determine if statistically significant differences existed in the age of the participants across sex. Results indicated that the age of participants across male and females did not significantly differ ( $F(1, 121) = .012, p = .912$ ).

Table 1

*Age, Sex and Group Composition*

Class Quality	No. of	No. of	<i>M</i>	Sex		
	classrooms	children	Age <sup>a</sup>	Contrasts <sup>b</sup>	% Male	% Female
High	3	41	60.17	H>M,L	34.1	65.9
Medium	4	41	55.15	M<H,L	41.5	58.5
Low	4	41	56.98	L>M; L<H	51.2	48.8

<sup>a</sup>Ages presented in months. <sup>b</sup>Contrasts represent age differences between quality groups.

Table 2

*ECERS-R Total Scores by Classroom and Mean ECERS-R Scores by Quality Group*

	Classroom	ECERS Total Score	Mean by Group
Low Quality	1	2.476	2.671
	2	2.585	
	3	2.659	
	4	2.929	
Medium Quality	5	3.976	4.180
	6	4.131	
	7	4.415	
	8	4.976	
High Quality	9	6.238	6.512
	10	6.429	
	11	6.821	

Cronbach's coefficient of reliability was also computed to determine the reliability of the 29 PLBS items or to determine how well the 29 PLBS items measured the unidimensional construct of learning behavior. Results determined that the reliability of the PLBS equaled an  $\alpha = .920$ .

## Research Questions and Hypotheses

### *Research question one*

The initial research question examined whether the items of the PLBS yielded robust dimensions of learning behavior for this sample. In order to evaluate the assumptions underlying factor analysis, first, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was computed in order to determine the strength of the correlations between pairs of variables. Results indicated that the KMO was equal to .891, indicating that the factor analysis could proceed as partial correlations between variables were relatively low and the correlations between pairs of variables were therefore relatively unaffected by other variables. Bartlett's Test of Sphericity was also completed in order to test the null hypothesis that the correlation matrix was an identity matrix, indicating that there were insufficient intercorrelations between variables. Results rejected the null hypothesis ( $\chi^2(276) = 1545.59, p < .001$ ) and indicated that there were sufficient correlations between variables and that the factor analysis could proceed. A confirmatory factor analysis (CFA) was conducted using the 24 PLBS items proposed by McDermott and colleagues (2002). Results of the CFA using principal axis factoring and varimax rotation, with an expected three-factor solution, are presented in Table 3.

Table 3

*Rotated Factor Loadings From Principal Axis Factoring*

PLBS Item	Factor Loading		
	1	2	3
1	.195	<b>.760</b>	.268
2	<b>.684</b>	.205	-.003
3	<b>.634</b>	.264	.025
4	.299	<b>.665</b>	.008
5	.423	.303	<b>.465</b>
6	<b>.691</b>	.066	.407
8	<b>.472</b>	.320	.125
9	<b>.439</b>	-.190	.412
10	.454	.230	<b>.585</b>
11	.137	<b>.732</b>	.177
12	<b>.508</b>	.111	.268
14	<b>.539</b>	.392	.382
15	<b>.645</b>	.490	.320
16	.342	.051	<b>.557</b>
17	<b>.572</b>	.349	.031
18	<b>.651</b>	.425	.276
19	-.002	.108	<b>.464</b>
20	-.066	.105	<b>.400</b>
21	<b>.448</b>	.130	.175



Table 3 (continued)

24	.365	.208	<b>.492</b>
25	.243	<b>.632</b>	.150
26	<b>.538</b>	.362	.362
28	.327	.379	.153
29	<b>.611</b>	.265	-.011

*Note.* Factor loadings are denoted by bold type.

Results indicated that the factor loadings ( $r \geq .40$ ) did not correspond with those found in the initial PLBS literature. Eigenvalues were inspected to determine if the expected three-factor solution was suitable for the 24 PLBS items, as indicated by the number of eigenvalues over 1, and are presented in Table 4.

Table 4

*Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors of the 24 PLBS Items*

Factor	Eigenvalues	% of variance	Cumulative %
1	9.341	38.922	38.922
2	1.937	8.073	46.995
3	1.628	6.781	53.777
4	1.302	5.424	59.201
5	1.020	4.249	63.450

Results point to five factors that had eigenvalues over 1, indicating that the expected three-factor solution did not satisfy the PLBS items entered into the analysis. Accordingly, an exploratory principal components analysis with varimax rotation was

conducted. The KMO measure of sampling adequacy (.874), and Bartlett's Test of Sphericity ( $\chi^2(406) = 1833.06, p < .001$ ) were determined to be adequate for the EFA to proceed. Results are presented in Tables 5 and 6.

Table 5

*Rotated Factor Loadings From Principal Components Analysis*

PLBS Item	Factor Loading						
	1	2	3	4	5	6	7
1	.815	.082	.238	-.078	-.040	.108	.054
2	.211	.655	.215	.033	-.126	.214	-.105
3	.248	.627	.144	-.099	-.058	.312	-.057
4	.750	.254	-.007	-.042	.014	-.060	-.187
5	.401	.376	.250	.034	.205	.281	.282
6	.141	.673	.326	.113	.243	.218	.166
7	-.170	.439	.276	.463	.288	.070	.152
8	.374	.346	.055	.087	.416	.192	-.468
9	-.183	.463	.285	.119	.512	.093	.088
10	.425	.420	.286	.285	.357	-.009	.200
11	.743	.041	.088	-.169	.074	.201	.048
12	.133	.297	.721	.014	-.035	.111	-.094
13	-.184	.030	.118	.767	-.019	.131	-.021
14	.561	.478	.334	.196	.104	-.054	.040
15	.635	.468	.338	.200	.064	.160	-.040
16	.145	.079	.823	.101	.213	.029	.049

Table 5 (continued)

17	.318	.377	.290	-.077	.145	.330	-.391
18	.493	.497	.312	.037	.263	.195	-.178
19	.198	.028	.144	-.050	.377	-.034	.568
20	.129	-.144	.018	-.011	.798	.067	.136
21	.142	.240	.173	.270	.009	.699	-.032
22	-.102	.128	.014	.361	.101	.055	.652
23	.054	-.151	.001	.823	-.015	-.068	.178
24	.338	.157	.620	.122	-.047	.209	.314
25	.639	.132	-.009	-.212	.168	.413	.043
26	.542	.434	.382	.148	.045	-.030	.007
27	.157	.310	.438	.418	.220	-.368	-.005
28	.322	.251	.036	-.144	.262	.513	.005
29	.292	.810	-.025	-.149	-.065	-.037	.075

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Table 6

*Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors of the 29 PLBS Items*

Factor	Eigenvalues	% of variance	Cumulative %
1	9.698	33.442	33.442
2	3.153	10.873	44.315
3	1.721	5.933	50.248
4	1.457	5.026	55.274
5	1.133	3.907	59.181
6	1.109	3.824	63.004
7	1.026	3.537	66.541

Results of the EFA indicated that seven components had eigenvalues over 1, with the solution accounting for 66.541% of the total variance of the 29 PLBS items. Review of the rotated factor matrix indicated that the 29 items did not load among factors that corresponded to the three-factor solution presented in the initial PLBS development and validation study (McDermott et al., 2002).

*Research question two*

The second research question examined whether the dimensions of preschool learning behavior were validated by other measures. It was hypothesized that each of the learning behavior dimensions would be validated by additional measures demonstrated to evaluate similar competencies (see pp. 117-119 for an explanation of the rationale underlying the use of these associated measures).

A bivariate correlation matrix was computed to evaluate the convergence of the 3 PLBS dimensions of Attention/Persistence, Competence Motivation, and Attitude Toward Learning, and the BASC-2 Attention Problems subscale, Initiative subscale of the DECA, and the Self-Control subscale of the DECA, respectively. Results indicated a strong negative correlation between the PLBS Attention/Persistence dimension and the BASC-2 Attention Problems subscale items ( $r = -.793, p < .001$ ), a strong positive correlation between the PLBS Competence Motivation dimension and the DECA Initiative subscale ( $r = .716, p < .001$ ) as well as strong convergence between the PLBS Attitude Toward Learning dimension and the DECA Self-Control subscale ( $r = .603, p < .001$ ). Means and standard deviations for these items are presented in Table 7. The correlation matrix for these items is presented in Table 8.

Table 7

*Means and Standard Deviations for Dimensions of Preschool Learning Behavior and Three Associated Measures*

Measure	<i>M</i>	<i>SD</i>
BASC-2 Attention Problems subscale	50.86	10.681
DECA Initiative subscale	52.00	10.889
DECA Self-Control subscale	53.12	10.444
PLBS Competence Motivation dimension	48.95	10.342
PLBS Attention/Persistence dimension	47.31	12.891
PLBS Attitude Toward Learning dimension	46.71	10.072

Table 8

*Correlations for Dimensions of Preschool Learning Behavior and Three Associated Measures*

Measure	1	2	3	4	5	6
1. BASC-2 Attention Problems subscale	--					
2. DECA Initiative subscale	-.703	--				
3. DECA Self-Control subscale	-.720	.716	--			
4. PLBS Competence Motivation dimension	-.619	.716	.630	--		
5. PLBS Attention/Persistence dimension	-.793	.690	.716	.766	--	
6. PLBS Attitude Toward Learning dimension	-.506	.460	.603	.596	.648	--

*Note.* All coefficients are significant at  $p < .01$ .

*Research question three*

The third research question analyzed whether children who experienced different levels of overall early childhood classroom quality demonstrated significantly different levels of overall preschool learning behavior. It was hypothesized that children who participated in lower quality ECCE programs would differ significantly in preschool learning behaviors from those children who attended higher quality programs, with the latter demonstrating significantly stronger positive learning behaviors.

In order to evaluate the assumption of normality underlying the ANOVA, stem-and-leaf plots and normal Q-Q plots of the PLBS Total score by quality condition

were examined. This review indicated that the data were normally distributed, with normal Q-Q plot data points clustering around the reference line. Further, examination of the box plots also indicated that the PLBS Total scores were normally distributed. A Shapiro-Wilk's test was also conducted to evaluate the normality of the data. Results indicated that the normality assumption was violated ( $p < .001$ ). However, considering the size of the sample, and the results of the examination of the normal Q-Q plots and boxplots, it was determined that any minor violation would have negligible effects on the results of the ANOVA.

It was believed that the independence of observations assumption underlying ANOVA was met as PLBS Total scores were independent of one another. However, the Durbin-Watson coefficient was calculated to further test this assumption as it provides a measure of the autocorrelations amongst variables (Myers & Well, 2003). Typically, coefficients falling between  $D = 1.5$  and  $2.5$  are indicative of the assumption being satisfied (Norusis, 2002). In this case, the Durbin-Watson coefficient was determined to fall within this range ( $D = 1.743$ ), indicating that the assumption was met.

In order to assess the homogeneity of variance assumption of ANOVA, the sample sizes of each group were examined to ensure that the design was balanced. Considering that each quality group was comprised of 41 preschool aged children, it was felt that there would be a small chance that the variances between groups would be unequal. However, in order to verify this assumption, Levene's Test of Homogeneity of Variances was conducted to test the equality of group variances. Results indicated that the assumption was violated ( $F(10, 112) = 2.036, p = .036$ ). As explained by Norusis (2002), "if the number of cases in each of the groups is similar, the equality of variance

assumption is not too important” (p.302) as the *F*-test is robust to violation of this assumption if the design is balanced. However, in order to compensate for the violation of this assumption, a stricter alpha level ( $\alpha = .01$ ) was chosen for the analysis.

Considering this, it was concluded that the ANOVA could proceed.

In order to evaluate this research question, a univariate ANOVA, using Type I sums of squares, was computed with classroom quality categorization treated as the fixed variable and individual classrooms as the random variable in order to account for each classroom’s ECERS-R score being applied to multiple children. Type I sequential sums of squares was utilized to account for the mixed model previously mentioned in that “each term [in the model] is adjusted for only the term that precedes it in the model” (SPSS Base User’s Guide, 1999a, p. 264). By using this method, the SPSS program tested the significance of overall classroom quality categorization alone, and the significance of individual classrooms after adjusting each for the classroom quality effect. Results of the ANOVA indicated that no statistically significant learning behavior differences were found between high, medium and low quality classrooms ( $F(2, 6.791) = .073, p = .930$ ). Using an  $\alpha = .01$ , no statistically significant PLBS Total score differences were found across each of the 11 individual ECCE classrooms either ( $F(8, 112) = 2.545, p = .014$ ).

Table 9

*Univariate Analysis of Variance Summary for PLBS Total Scores*

Source	<i>df</i>	Type 1 SS	MS	<i>F</i>
Classroom Quality	2	59.236	29.618	.073
Individual Classrooms	8	2811.654	351.457	2.545



#### *Research question four*

The focus of the fourth research was to determine if children who experienced different levels of ECCE program quality significantly differed across the three preschool learning behavior dimensions of Competence Motivation, Attention/Persistence, and Attitude Toward Learning. It was hypothesized that children exposed to higher quality ECCE experiences would have significantly stronger preschool learning behaviors across each of the dimensions than would those exposed to lower quality ECCE environments.

The multivariate normality assumption was assessed via a review of the histograms, stem-and-leaf plots, and normal Q-Q plots. Results indicated that the normality assumption was tenable. Box's Test of Equality of Covariance Matrices was conducted to determine if the second MANOVA assumption was met. Results indicated that the covariance for all pairs of PLBS dimension scores was unequal across quality groups ( $p = .005$ ). In order to compensate for this violation, it was determined that a stricter alpha level ( $\alpha = .01$ ) would be used in the analysis. Also, since each quality group was comprised of an equal number of observations, it was determined that the robustness of the MANOVA was guaranteed and the assumption met. The final assumption, independence of observations, was determined to be met as each child's PLBS dimension score was not influenced by other children in his or her quality group.

A MANOVA was conducted in order to determine if children who were in high, medium, and low quality preschools differed across the three PLBS dimensions of Attention/Persistence, Competence Motivation, and Attitude Toward Learning. Results indicated that there were no significance differences between any of the three groups across the PLBS dimensions. Results are presented in Tables 10 and 11.

Table 10

*Mean Scores and Standard Deviations for PLBS Dimensions Across Quality Groups*

Quality Group	Preschool Learning Behavior Dimensions					
	Attention/Persistence		Competence Motivation		Attitude Toward Learning	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
High Quality	46.49	16.193	49.17	11.975	45.00	9.028
Medium Quality	47.37	11.631	48.78	10.014	48.71	9.347
Low Quality	48.07	10.393	48.90	9.080	46.41	11.548

Table 11

*Multivariate Analysis of Variance Summary for PLBS Dimension Differences Across Classroom Quality*

Dependent Variable	<i>df</i>	Type III SS	MS	<i>F</i>
PLBS Attention/Persistence	2	51.724	25.862	.153
PLBS Competence	2	3.268	1.634	.015
PLBS Attitude Toward	2	287.024	143.512	1.425

*Note.* The independent variable in this analysis was classroom quality.

*Research question five*

Precisely which of the 16 ECCE quality factors identified by Cassidy and colleagues (2005) were predictive of overall preschool learning behavior, was the focus of the fifth research question. It was hypothesized that items from ECERS-R subscales that were aligned with developmentally appropriate instructional and learning practices

(i.e., Language-Reasoning, Activities, Interactions and Program Structure) would be the greatest predictors of preschool learning behavior.

A review of a generated histogram and normal P-P plot of regression standardized residuals appeared to indicate that the residuals were in fact distributed normally around the predicted dependent variable scores, indicating that the normality assumption was met. Examination of a residual plot of standardized residuals versus predicted values indicated that residuals appeared to randomly scatter indicating that assumption of linearity was met. A review of residual plots indicated that the assumption of homoscedasticity was satisfied as well. Finally, with regards to multiple regression assumptions, the independence of observations appeared to be met as the calculated Durbin-Watson coefficient was determined to equal 1.953, which indicated that the adjacent observations were not correlated. In order to determine if outliers were influencing the results of the regression model, values for the Mahalanobis distance, centralized leverage and Cook's D were computed for each case and compared to cut-off values to determine if the scores violated such values; an indication of an extreme score. Three cases violated the Mahalanobis distance cut-off value of 29.588, however none of these cases, nor did any of the other cases violate the Cook's D cut-off value of  $>1$ , or the centralized leverage cut-off value of .4146. As such, all cases were retained in the analysis.

Multiple regression analysis was used to determine a model for predicting overall preschool learning behavior from 16 ECERS-R quality items identified by Cassidy and colleagues (2005). Descriptive statistics are presented in Table 12. Of the 16 predictor variables included in the analysis, 6 were excluded as tolerance limits were reached,

indicating that the variables were a near linear combination of other independent variables. Of the 10 predictors that were retained, only two, Fine Motor and Group Time, had statistically significant ( $p < .05$ ) correlations with the PLBS Total score (see Table 13). The two predictor model accounted for 15.7% of the variance in overall learning behavior ( $F(10, 112) = 2.079, p < .05$ ).

Table 12

*Means and Standard Deviations of the 16 ECERS-R Predictor Variables and Correlations to Overall Learning Behavior*

Variable	<i>M</i>	<i>SD</i>	Correlation
Preschool Learning Behavior Total Score	48.72	12.261	--
Predictor Variable			
1. Furnishing for Relaxation	4.878	1.912	.071
2. Space for Privacy	4.565	2.088	-.008
3. Books and Pictures	4.577	1.881	.058
4. Fine Motor	4.984	2.074	.054
5. Art	4.248	1.660	.155
6. Blocks	4.350	2.098	-.013
7. Dramatic Play	4.447	2.047	.072
8. Nature/Science	3.553	2.480	.127
9. Math/Number	3.874	2.207	.063
10. Using language to develop reasoning skills	3.549	1.679	-.045
11. Informal use of language	4.232	1.817	.023
12. General supervision of children	4.573	1.617	-.075

Table 12 (continued)

13. Discipline	4.268	1.819	.007
14. Staff-child interactions	4.171	2.285	-.066
15. Interactions among children	5.301	1.663	-.068
16. Group time	4.179	2.222	.123

Table 13

*Regression Analysis Summary for 10 ECERS-R Quality Variables Predicting Children's Overall Learning Behavior*

Variable	<i>B</i>	<i>SEB</i>	$\beta$
1. Furnishing for Relaxation	-1.618	2.563	-.253
2. Fine Motor	3.788	1.880	.641*
3. Art	.498	3.168	.067
4. Blocks	1.609	3.290	.275
5. Nature/Science	-.572	3.640	-.116
6. Using language to develop reasoning skills	-6.413	3.609	-.878
7. General supervision of children	2.397	1.543	.316
8. Staff-child interactions	-3.822	2.866	-.712
9. Interactions among children	1.370	1.421	.186
10. Group time	4.389	1.951	.795*

*Note.*  $R^2 = .157$  ( $N = 123$ ,  $p < .05$ ).

\* $p < .05$ .

#### *Research question six*

The sixth research question sought to determine whether statistically significant differences in early academic skills were found among children who participated in ECCE programs of different overall classroom quality. The hypothesis was that statistically significant differences in overall early academic achievement would emerge between children participating in high, medium, and low quality early educational environments.

In order to evaluate the normality assumption underlying the ANOVA, stem-and-leaf plots and normal Q-Q plots of the overall academic skills score by quality condition were examined. This review indicated that the data were normally distributed, with normal Q-Q plot data points clustering around the reference line. Further, examination of the box plots also indicated that the overall early academic skills scores were normally distributed. A Shapiro-Wilk's test was also conducted for each of the three quality groups in order to evaluate the normality of the data. Results indicated that the normality assumption was met for each group ( $p > .202$ ).

It was believed that the independence of observations assumption underlying ANOVA was met as overall early academic skill scores were independent of one another. However, the Durbin-Watson coefficient was calculated to further test this assumption as it provided a measure of the serial correlations amongst variables (Myers & Well, 2003). Typically, coefficients falling between  $D = 1.5$  and  $2.5$  are indicative of the assumption being satisfied (Norusis, 2002). In this case, the Durbin-Watson coefficient was determined to fall within this range ( $D = 1.766$ ), indicating that the assumption was met.

In order to assess the homogeneity of variance assumption of ANOVA, the sample sizes of each group were examined to ensure that the design was balanced. Considering that each quality group was comprised of 41 preschool aged children, it was felt that there would be only a small chance that the variances between groups would be unequal. However, in order to verify this assumption, Levene's Test of Homogeneity of Variances was conducted to evaluate the equality of group variances. Results indicated that the assumption was met ( $F(10, 112) = 1.038, p = .417$ ).

In order to evaluate this research question, a univariate ANOVA, using Type I sum of squares, was computed with classroom quality categorization treated as the fixed variable and individual classrooms as the random variable in order to account for each classroom's ECERS-R scoring being applied to multiple children. Results of the ANOVA indicated that statistically significant achievement differences were found between high, medium and low quality classrooms ( $F(2, 7.039) = 6.681, p < .05$ ). Statistically significant achievement score differences were also found across each of the 11 individual ECCE classrooms ( $F(8, 112) = 3.227, p = .01$ ). Results are presented in Table 14.

Table 14

*Univariate Analysis of Variance Summary for Overall Achievement Scores*

Source	<i>df</i>	Type 1 SS	MS	<i>F</i>
Classroom Quality	2	785.431	392.715	6.681*
Individual Classrooms	8	401.201	50.150	3.227**

\* $p < .05$ . \*\* $p < .01$ .

As results indicated statistically significant achievement score differences across quality conditions with the inclusion of the random classroom effect, a one-way ANOVA was computed without the random classroom effect. Results indicated that statistically significant differences in mean overall academic achievement existed across quality classroom groups ( $F(2,120) = 22.005, p < .001$ ), and are found in Table 15. Post-hoc comparisons were completed in order to determine which of the group means differed significantly. Results of Tukey Honestly Significant Difference (HSD) post-hoc analysis revealed that children in high quality preschool classrooms had significantly higher overall academic achievement than children attending medium and low quality classrooms ( $p < .001$ ). Also, children in medium quality preschool classrooms had higher overall academic achievement than their low quality classroom counterparts ( $p < .05$ ).

Table 15

*One-Way Analysis of Variance Summary for Overall Achievement Scores*

Source	<i>df</i>	SS	MS	<i>F</i>
Between Groups	2	785.431	392.715	22.005***
Within Group	120	2141.561	17.846	
Total	122	2926.992		

\*\*\* $p < .001$ .



Table 16

*Mean Scores of Overall Achievement as a Function of Participant Quality Group*

	High Quality (1)		Medium Quality (2)		Low Quality (3)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Overall Achievement	34.29	4.686	30.59	3.585	28.15	4.328
Post hoc	1 > 2, 3		2 > 3			

*Note.* The numbers in parentheses in the column heads refer to the numbers used for illustrating significant differences in the last row titled “Post hoc.”

*Research question seven*

The seventh research question of this study analyzed whether children who experienced different levels of overall early childhood classroom quality significantly differed across the early academic skill areas of reading, mathematics, writing, and spoken language. It was hypothesized that statistically significant differences would be found between quality groups, with those children who experienced higher preschool quality demonstrating higher levels of achievement across each academic domain when compared to their medium and low ECCE quality counterparts.

The multivariate normality assumption was assessed via a review of histograms, stem-and-leaf plots, and normal Q-Q plots. Results indicated that the normality assumption was tenable. Box’s Test of Equality of Covariance Matrices was conducted to determine if the second MANOVA assumption was met. Results indicated that the covariance for all pairs of achievement scores were unequal across quality groups ( $p = .002$ ). To compensate for this violation, the analysis was conducted using a stricter alpha level ( $\alpha = .01$ ). By making such a correction, in concert with the fact that each quality

group was comprised of an equal number of observations, it was determined that the robustness of the MANOVA was guaranteed and the assumption met. The final assumption, independence of observations, was determined to be met as each child's achievement score was not influenced by other children in his or her quality group.

A MANOVA was conducted to determine if children who were in high, medium, and low quality preschool classrooms differed across each of the four areas of early academic skills. Results indicated that there were significant differences between the three groups across all academic areas ( $p < .01$ ). Results are presented in Table 17. Tukey HSD post-hoc comparison results indicated that children in high quality ECCE programs performed significantly better than children that participated in medium and low quality programs across the academic domains of spoken language, reading and writing ( $p < .05$ ). Children in high quality programs also performed better in mathematics than did their low quality ECCE counterparts ( $p < .05$ ), but not better than children who participated in programs of medium quality ( $p > .05$ ). Further, children who participated in medium quality ECCE programs outperformed children from low quality programs across all academic areas ( $p < .05$ ). Results are presented in Table 18.

Table 17

*Multivariate Analysis of Variance Summary for Achievement Score Differences Across Classroom Quality*

Dependent Variable	<i>df</i>	Type III SS	MS	<i>F</i>
Spoken Language	2	233.382	116.691	26.888**
Reading	2	92.634	46.317	14.212**
Writing	2	950.260	475.130	20.748**
Math	2	22.309	11.154	6.505**

*Note:* The independent variable in this analysis was classroom quality.

\*\* $p < .01$ .

Table 18

*Mean Scores and Standard Deviations for Achievement Scores Across Quality Groups.*

	Achievement Areas							
	Spoken Language		Reading		Writing		Math	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Quality Group								
High (1)	12.17	2.756	10.98	1.508	11.00	4.990	11.15	1.315
Medium (2)	9.46	1.629	10.02	1.837	6.63	5.485	11.10	1.319
Low (3)	9.07	1.664	8.85	2.032	4.29	3.703	10.22	1.294
Post hoc	1>2>3		1>2>3		1>2>3		1,2>3	

*Note.* The numbers in parentheses next to the individual quality groups refer to the numbers used for illustrating significant differences in the last row titled “Post hoc.”

#### *Research question eight*

The final research question analyzed whether the effect of ECCE program quality on early academic skill level was mediated by preschool learning behavior. It was hypothesized that learning behavior would have a mediating effect on the relationship between program quality and early academic skill.

Multiple regression analyses were used to test this hypothesis. First, it was necessary to determine whether there was a significant relationship between the independent variable of ECCE program quality and the dependent variable of early academic skill that could be mediated. Regression results, as presented in Table 19, indicated that program quality was a significant predictor of overall early academic skill ( $F(2, 120) = 21.522; p < .001$ ), indicating that Path *c* was a relationship that could be mediated. Accordingly, a follow-up regression was conducted in order to determine if the independent variable of program quality was correlated with mediator variable of preschool learning behavior. Results, as presented in Table 20, indicated that the relationship between these two variables was not statistically significant ( $F(2, 120) = .136; p = .873$ ). In light of this nonsignificant result, analyses were terminated, and it was determined that the mediational hypothesis was unsupported.

Table 19

*Regression Analyses for Early Academic Skills Regressed on Program Quality*

Variable	<i>B</i>	<i>SEB</i>	$\beta$
1. Quality Code 1	6.139	.948	.593***
2. Quality Code 2	2.311	.937	.226*

*Note.*  $R^2 = .264$  ( $N = 123$ ,  $p < .001$ ).

\* $p < .05$ . \*\*\* $p < .001$ .

Table 20

*Regression Analyses for Preschool Learning Behavior Regressed on Program Quality*

Variable	<i>B</i>	<i>SEB</i>	$\beta$
1. Quality Code 1	1.411	2.762	.054
2. Quality Code 2	.481	2.731	.019

*Note.*  $R^2 = .002$  ( $N = 123$ ,  $p = .873$ ).

## CHAPTER V

### DISCUSSION

Overall, the results of the present study were mixed. Several of the hypotheses were supported, while others lacked the empirical evidence necessary to uphold the hypothesized conclusions. Confirmatory factor analyses failed to support the initial hypothesis for this study, indicating that the 24 PLBS items did not yield three robust dimensions of learning behavior as reported elsewhere (see McDermott et al., 2002). Rather, the results indicated that five factors were present, with very few of the factor loadings corresponding with previous work. Accordingly, an exploratory factor analysis was conducted which also found that the PLBS items did not load among three distinct factors as hypothesized, but rather resulted in a seven-factor solution.

The second research question sought to explore the validity of the PLBS and test the hypothesis that convergent validity would be found among the three PLBS dimensions and additional measures that have been proposed to evaluate similar competencies. Results indicated that this hypothesis was supported, noting statistically significant convergent validity among each of the three preschool learning behavior dimensions and the respective associated measures.

The third research question examined whether children who participated in early childhood programs of various quality, demonstrated significantly different levels of preschool learning behavior. The hypothesis that children from programs of higher quality would demonstrate more positive preschool learning behaviors than those from lower quality programs, was not supported. Accordingly, the follow-up research question, which examined whether children from different quality ECCE programs differed across

each of the three preschool learning behavior dimensions, was not supported either. Such a finding fails to support the hypothesis that children from higher quality ECCE programs would demonstrate significantly stronger preschool learning behaviors across each of the three PLBS dimensions when compared to children from lower quality programs.

In trying to determine which ECCE quality factors were predictive of overall preschool learning behavior, a multiple regression analysis was conducted. Each of the 16 ECCE quality factors identified by Cassidy and colleagues (2005) as being most predictive of classroom quality were treated as predictor variables, with overall or total preschool learning behavior treated as the criterion variable. It was hypothesized that those items aligned with developmentally appropriate instructional and learning practices would contribute to the prediction of learning behavior. The analysis found that only two of these variables, Fine Motor and Group Time, were actually contributory.

The effect ECCE classroom quality had on the development of early academic skills was the focus of the sixth research question in the present study. It was hypothesized that significant differences in early academic achievement would be noted among children who participated in high, medium and low quality programs. The results of analyses supported this hypothesis. Specifically, post-hoc analyses indicated that children from high quality ECCE programs outperformed peers from medium and low quality programs, while children from medium quality programs outperformed those participating in low quality environments. Follow-up multivariate and post-hoc analyses examined this relationship at more discrete levels of academic achievement and found that children participating in high quality programs exceeded the achievement of children participating in medium and low quality programs across the scholastic areas of spoken

language, reading and writing. Identical results were found between children in medium and low quality preschools. In the scholastic area of mathematics, results indicated that children in high and medium quality programs outperformed children in low quality programs; however, no differences were noted between children participating in high and medium quality programs.

The eighth research question sought to evaluate whether preschool learning behavior served to mediate the effect ECCE program quality had on early academic achievement. The hypothesis, that preschool learning behavior had a mediating impact on this relationship, was not supported.

## Conclusions

### *Factor structure of the PLBS*

It was hypothesized that the factor structure of the PLBS for this sample of preschool-aged children would resemble that presented in the limited work previously conducted with the measure. McDermott and colleagues (2002) reported that 24 items of the PLBS loaded among three distinct learning behavior dimensions: Competence Motivation, Attention/Persistence, and Attitude Toward Learning. The results of a CFA and EFA for the sample in the present study, however, were inconsistent with this reported factor structure. The results of both analyses indicated that one factor accounted for the majority of the variance. For the CFA, 13 of the 24 PLBS items loaded on the first factor. These loadings were representative of items from each of the PLBS dimensions of Attention/Persistence (4 items), Attitude Toward Learning (2 items) and Competence Motivation (8 items; one item shared with Attention/Persistence dimension). The second factor consisted of four items from the dimensions of Attention/Persistence (3 items) and



Competence Motivation (1 item). The third factor consisted of six items from the dimensions of Attention/Persistence (2 items), Competence Motivation (1 item), and Attitude Toward Learning (3 items). For the EFA, nine of the PLBS items loaded on the first factor with no more than five items loading on each of the other six factors. What is interesting about the items that loaded on the first EFA factor is that 8 of the 9 items were associated with the nine item PLBS Attention/Persistence subscale. For the remaining factors, however, no one factor had such representative item loadings as have been previously reported.

While these findings are quite different from those found and reviewed previously, it is not to say that the factor structure reported elsewhere is not accurate. Rather, the current analysis may have been restricted by adequate sample representation. Such restrictions may have greatly limited the accuracy of the findings, leading to conclusions that are disparate from those found previously. Also, the tendency for each of the three PLBS dimensions' items to load on the first factor in the CFA analysis may indicate that the PLBS items do in fact represent an overall measure of learning behavior, but are not adequate to provide a measure of dimension specific behavior. This too may have been influenced by the representativeness of the sample, as well as by the reported PLBS factor structure in which particular PLBS items are shared by more than one learning behavior dimension.

#### *Validity of the PLBS*

The likelihood that the PLBS dimensions would converge with measures purported to evaluate similar competencies was evaluated by the second research question. The results demonstrated that each of the PLBS dimensions did in fact correlate

with associated measures, providing evidence of convergent validity. While previous work has demonstrated both convergent and divergent validity for the scale (see Fantuzzo et al., 2004; McDermott et al., 2002; Schaefer et al., 2004), other reports of convergent validity using measures directly associated with each of the PLBS dimensions has not been noted in the extant literature (see pp. 117-119 for an explanation of the rationale underlying the use of these associated measures). Although generally supportive of the validity of the PLBS, results of this analysis are interesting. Specifically, while each of the PLBS dimensions correlated with associated measures to levels of statistical significance, so too did each of the PLBS dimension scores with associated measures for other PLBS dimensions. For example, statistically significant correlations were noted between the PLBS dimension of Attention/Persistence and the DECA Initiative subscale ( $r = .690, p < .001$ ) as well as the DECA Self-Control subscale ( $r = .716, p < .001$ ). Similarly strong correlations were noted between the PLBS dimension of Competence Motivation and the BASC-2 Attention Problems subscale ( $r = -.619, p < .001$ ), as well as the DECA Self-Control subscale ( $r = .630, p < .001$ ). Moreover, statistically significant correlations were found between the PLBS dimension of Attitude Toward Learning and the DECA Initiative subscale as well as with the BASC-2 Attention Problems subscale ( $r = .460, p < .001$ ;  $r = -.506, p < .001$ , respectively). While this result may have been influenced by the PLBS structure, in that certain items were shared by more than one dimension of the scale, it does lead to speculation as to whether the individual PLBS dimensions were truly assessing the purported competencies of their respective domains. Rather, such high intercorrelations may indicate that each dimension of the PLBS was measuring, to a certain degree, competencies subsumed under another of the PLBS

dimensions such that each dimension was contributing to the overall or total measurement of learning behavior, but is not discrete enough to purely assess its purported competency. These high correlations between each of the PLBS dimensions and each of the associated measures may be thought of as indicating that the learning behavior strengths or weakness exhibited by each child were associated with strengths or weaknesses in other areas of functioning. For example, strength in learning behavior of Attention/Persistence, as measured by the PLBS, was often accompanied with strength in DECA subscales of Initiative and Self-Control, indicating somewhat of a linear trend. However, considering that there was not another scale available that purported to measure the learning behaviors of young children, it was not possible to be entirely certain that the associated measures truly assessed the construct and dimensions of learning behavior.

#### *Effect of classroom quality on preschool learning behavior*

The third and fourth analyses conducted in the present study sought to determine whether children enrolled in ECCE programs of varying quality demonstrated significantly different levels of overall and dimension specific (i.e., Competence Motivation, Attention/Persistence, Attitude Toward Learning) preschool learning behavior. While such an inquiry is the first of its kind reported, the basis for the inquiry was rooted in the findings of previous work that reported that children exposed to higher quality early childhood opportunities demonstrated greater academic success (see Campbell & Ramey, 1994; Gray et al., 1982; NICHD Early Child Care Research Network, 2002) and the finding that youngsters with strong learning behavior (see Schaefer & McDermott, 1999) enjoy higher scholastic achievement. The results for both

of these inquiries, however, proved to be nonsignificant. Such findings may be the result of methodological circumstances in that children from the same ECCE classroom were assigned duplicate quality scores. Alternatively, such a result may indicate that children participating in programs of varying quality do not demonstrate statistically significant differences in overall or dimension specific learning behavior. Such findings may indicate that the global quality of the early childcare and education program to which the child is exposed, as measured by the ECERS-R, has little to do with the strength and quality of the learning behavior demonstrated by the preschool-aged child. Possibly, other quality variables that are not assessed by the ECERS-R may have a stronger influence on the development and quality of learning behavior. Variables such as quality of instruction and type of emotional reciprocity shared by ECCE educators and their students, two variables measured by the Classroom Assessment Scoring System (CLASS), may have served to further distinguish the quality of these classrooms and the learning behaviors exhibited by the participating students. Also, other factors, in addition to classroom quality, may play a greater or contributory role in the formation of learning behavior.

For example, the parenting style employed by each child's parent may have had a tremendous impact on his or her formation and the maintenance of learning behavior. Authoritative parents who demonstrate a warm yet firm approach to rearing their children may greatly impact the formation of these behaviors in that relatively high expectations are established for the child both academically and behaviorally, yet children are free to explore their surrounding world with adequate supervision which stimulates curiosity. In turn, these children may develop the ability to regulate behavior that mimics a positive

learning style. Heredity is yet another potential factor that may impact the formation of learning behavior. Children who are more genetically predisposed to developing adequate skills across areas of learning behavior may be more likely to form those tendencies that are aligned with positive learning behavior and experience subsequent academic and behavioral success. Despite these two aforementioned factors that may potentially impact the formation of learning behaviors, the influence of multiple factors may prove to be most influential in learning behavior formation.

*Program quality as predictors of learning behavior*

Based on research previously conducted with the ECERS-R (viz., Cassidy et al., 2005), a multiple regression analysis was conducted utilizing 16 predictor items that comprised two distinct classroom quality factors (Activities/Materials & Language/Interaction) in order to determine which of these factors was most predictive of overall learning behavior. It was hypothesized that each of these 16 items would be predictive of preschool learning behavior. Such a hypothesis was based on the Piagetian proposition that young, preoperational children need environmental circumstances that allow for exploration and the construction of learning, as well as Vygotsky's theoretical position that children learn and grow through social interaction and succeed in more advanced tasks through interaction with a skilled assistant. The results of this analysis, however, failed to support such a conclusion. Rather, the results indicated that only two of these ECERS-R items, Fine Motor and Group Time, served to predict a child's overall preschool learning behavior.

Such a finding is interesting for several reasons. It was expected that most if not all of these items, considering that learning behaviors are a child's response to the

demands of the educational environment, would influence learning behavior. Such responses include those behaviors that are observable and inclusive of “problem-solving strategies, decision-making behaviors, and the child’s reactions to the expectations and limitations of school learning situations” (McDermott & Beitman, 1984 p. 6), which are presumably evoked by a child’s educator as he or she is responsible for organizing and facilitating learning opportunities. Accordingly, it would be expected that quality items linked to the child-teacher interactions, such as General Supervision of Children (Item # 30), Discipline (Item # 31) or Staff-child Interactions (Item # 36), would have contributed to the prediction of learning behavior. While no previous work has examined the potential relationship between these variables, based on these findings, it may be concluded that learning behavior is not greatly influenced by items that constitute early childhood program quality among the two domains of Activities/Materials & Language/Interaction.

Alternatively, the results may indicate that while the method utilized to assess programmatic quality in the present study has and continues to be considered the highest standard by which to evaluate quality in ECCE environments, it may not be sensitive enough to evaluate other variables that may serve to predict preschool learning behavior. For example, a more recent method by which to evaluate program quality is the Classroom Assessment Scoring System (CLASS), which is “conceptualized as an assessment of the pre-kindergarten classroom as a learning environment (Pianta et al., 2005, p. 145). As the ECERS-R seeks to evaluate global process quality of the ECCE classroom, the CLASS seeks to measure “the nature and form of the emotional and instruction climate of the classroom” (Pianta et al., p. 145). Potentially, the CLASS

related variables of “how productive the environment appears in use of time and activities; how sensitive is the teacher’s behavior; the quality of instruction and feedback to the students; the effectiveness of behavior management; and the extent to which activities and interactions stimulate conceptual development and engagement” may produce more substantial findings with relation to the prediction of preschool learning behavior (Pianta et al., p. 145). In support of this potential relationship between CLASS variables and preschool learning behavior is the proposition of learning behavior proponents who have speculated in the available literature that such behaviors can be taught to children and modified. In order to accomplish this, it is reasonable to assume that instructional climate of the classroom would play a significant role. Regrettably, only a limited number of studies have been conducted with the CLASS to date, and as with the present analysis which examined the relationship between ECERS-R quality factors and learning behavior, no additional speculation can be made at the current time.

#### *Programmatic quality and early academic skills*

The sixth and seventh research questions examined whether there were differences in overall and domain specific academic skills of children from programs of various levels of quality. Hypotheses made for both the univariate and multivariate analyses indicated that children from higher quality programs would receive higher overall and domain specific academic skill scores than children in lower quality programs. ANOVA results indicated that statistically significant differences existed between groups, with post-hoc analyses demonstrating that preschool-aged children participating in high quality ECCE environments scored significantly higher overall than did children in medium and low quality programs. Moreover, children in medium quality

programs outperformed those in low quality programs. MANOVA results also indicated statistically significant differences between groups across each of the four academic content areas assessed by the BSSI-3 (i.e., Spoken Language, Reading, Mathematics, and Writing). Results indicated that children who participated in high quality programs outperformed those in medium quality programs, who outperformed those that participated in low quality ECCE environments across spoken language, reading and writing. In mathematics, results indicated that children in high and medium quality programs outperformed their low quality ECCE program counterparts, however no statistically significant mathematics score differences were noted between high and medium quality groups.

Such findings support the hypotheses that children participating in programs of higher quality perform better academically than those in lower quality programs. These findings are generally consistent with those found elsewhere (e.g., Barnett, 1995; Ramey & Campbell, 1984, 1991; Ramey & Ramey, 2004) and lend support to the position that children who attend higher quality ECCE programs tend to demonstrate greater academic gains than children in programs of lower quality. From a theoretical perspective, such results are not surprising as higher quality programs incorporate the developmental perspectives of Piaget and Vygotsky into programmatic construction and facilitation through DAP, which serves to bolster a child's learning and academic success when compared to programs that do not embrace such a programmatic focus.

#### *Influence of preschool learning behavior on the quality–achievement relationship*

The function of preschool learning behavior as a mediator between ECCE classroom quality and early academic skill level was evaluated in the eighth research



question. Based on the extant literature, which indicated a relationship existed between school aged learning behavior and academic outcomes, and quality ECCE programs and academic outcomes, it was hypothesized that learning behaviors would serve to mediate this relationship. Results of multiple regression analyses found that while there was a significant relationship between ECCE quality and early academic skill level that could be mediated, when academic skill was regressed on quality, analyses had to be terminated as no statistically significant relationship was found between learning behavior and early academic skills. As such, it may be concluded that preschool learning behaviors do not have a direct effect on the relationship between classroom quality and academic outcomes. Such a finding may indicate that the inclusion of preschool learning behaviors in determining likely academic skill outcomes may not be advantageous, particularly from a statistical perspective. Practically, however, each of the learning behaviors put forth for the preschool cohort have been shown to be important in formal aged schooling, as previously discussed. Moreover, Competence Motivation, Attitude Toward Learning and Attention/Persistence have each been demonstrated, in literature bases separate from learning behavior, as essential to school success.

Based on the most recent studies conducted on learning behaviors, their potential influence on academic outcomes should not be ignored. Several independent analyses have similarly concluded that learning behaviors are highly correlated with success across scholastic domains, as well as correlated highly with social and behavioral outcomes. While far less research has been conducted with learning behavior among the preschool cohort, the available literature allows for the same assertion to be made: Stronger learning behaviors are correlated with more positive outcomes. What has also

been shown through decades of research, as well as in the present study, is that quality ECCE programs lead to higher academic achievement among participants. What the present findings demonstrate is that learning behaviors may not be the “keystone” to educational success, particularly among the preschool cohort. Their presence, or lack thereof, does not have a significant impact on the academic outcomes of children who participate in programs of varying quality. This finding, viewed in concert with those of past studies, suggest that preschool learning behavior, along with a myriad of other variables, be thoroughly analyzed to determine the potential importance or irrelevance of each, so to better inform the field as a whole.

#### Limitations

This research study was limited in number of ways. First, while the sample of this study met the minimum requirements established at the study’s inception, it would have been ideal if the sample was larger. The desire to increase the sample size would include both the number of children that participated in the study, as well as the number of ECCE classrooms that took part. It would have been ideal if the number of participating classrooms across each quality ranking would have been considerably larger. Such an increase would have allowed for a wider sampling of preschool quality conditions and the children participating in these respective programs. Also, an increase in the number of participating ECCE programs would have enabled the present analysis to examine, more purely, the influence of programmatic quality on learning behavior and scholastic achievement, without concern for identical ECCE quality scores being applied to multiple children. This idiosyncratic error, which was multiplied by applying only 1 of 11 possible

ECERS-R scores to each of the 121 children in this study, likely had an impact on the findings.

Another limitation of this study is in relation to the methods by which preschool learning behavior and associated measures data was collected. Specifically, each classroom teacher completed the PLBS, BASC-2 Attention Problems subscale items, and the DECA for each participating child. This method allowed for possible biases toward particular children to potentially influence the results of the study. As such, positive behavioral ratings for children, who received the positive bias of their early childhood educators, may have been amplified while negative behavioral reports minimized. Potentially, the inverse of this scenario was true as well.

Yet another limitation of the methods by which the data was collected is of concern. While primary ECCE classroom educators completed the PLBS and associated measures, the BSSI-3 was completed by the primary investigator via observation of group time and independent work, review of work samples, child initiated interaction and consultation with each child's respective program educator. Once again, while every effort was made to ensure objectivity across observations and interactions, observer bias may have influenced the results to some extent and inserted error into the aforementioned analyses.

### Recommendations for Future Research

Future research could take several possible directions. Generally, it is recommended that investigations into learning behaviors, both at the preschool and school-aged level, continue. Unlike the construct's predecessor, learning styles, which received little attention in comparison to other avenues of inquiry, it is hoped that an

increased amount of emphasis is placed on exploring learning behavior. As a starting point, and in light of the relative novelty of the PLBS and limited studies that have been conducted to date, it is recommended that future research seek to provide additional validation of the measure. While convergent validity was found among the PLBS and associated measures in the present study, no studies other than those completed by the construct's authors have sought to provide additional validation for the measure using dimension specific associated measures. Such validation should be inclusive of individually administered measures, as well as measures completed by pairs of observers. This validation step should also seek to confirm the factor structure of the PLBS as has been reported by the scale's author.

Second, it is recommended that additional research seek to completely explore the potential relationship between preschool learning behavior and ECCE quality. While the relationship was found to be nonsignificant in the present study, it is felt that through future research that incorporates a much larger sample of ECCE programs, the question of a possible relationship between these two variables could be answered. Ideally, such a sample should consist of a relatively large cross sample of preschool aged children, and not be limited by sociodemographic characteristics or by geographic region. By encompassing a large number of programs, and a sample that is inclusive of proportionate numbers of individuals aligned with societal composition, the effect of assigning identical classroom quality scores to each room's respective children will be minimized and allow for a more accurate evaluation of this relationship across children and among subgroups. Additionally, examining this question should incorporate other means by which to assess ECCE program quality, such as the CLASS. Incorporating alternative quality measures

may allow for the determination of which, if any, ECCE classroom quality factors are predictive of such behaviors.

These analyses could be scrutinized further by incorporating both public and private ECCE programs into this representative sample. Doing so would allow for an examination and comparison of ECCE quality, preschool learning behaviors and academic achievement, among Head Start participants as well as those attending private early childhood programs. The incorporation of public sector programs would mimic those included in previous work, however the inclusion of private facilities, outside the present study, has yet to be completed. Doing so would allow for an investigation and comparison of the preschool learning behaviors demonstrated by children from each type of program.

Yet another area of potential research that is necessary, considering the proponents' claims that learning behaviors can be taught and modified, is to explore whether preschool learning behaviors can in fact be communicated and improved upon in such a manner. Results of such an analysis could have remarkable implications. In order to conduct such a study, it is recommended that researchers assess learning behaviors by way of the PLBS. From these results, empirically validated interventions for enhancing students' Attitudes Toward Learning, Attention/Persistence, as well Competence Motivation could be employed. Post-intervention assessment, using the PLBS, would allow for analyses to determine whether learning behaviors can in fact be altered via instructional practices. Moreover, a comparison of pre- and post-intervention achievement results would allow for the determination of whether learning behavior and academic achievement share a linear relationship. This could be extended even further to

include the school-aged population, for which there has yet to be a study that has examined the extent to which these behaviors can be altered.

Finally, if learning behavior research continues and is proven to be a viable construct that possesses practical implications, which are shown through empirical evidence to be changeable, longitudinal research should be conducted to determine the value of promoting these learning behaviors from preschool through high school graduation. Doing so will allow for the value of learning behaviors to be determined. That is, if learning behaviors are as valuable as the construct's proponents report them to be, empirical data should demonstrate that children, who have been instructed in a manner that promotes and maintains these behaviors, should experience far fewer grade retentions, receive far less special education services, witness higher secondary school graduation rates, perform better on standardized measures of achievement, and witness higher rates of college enrollment. While such a proposal may appear to be lofty, particularly considering the less than supportive results of the present study, the overarching question as to the importance of learning behavior remains, and without a formal examination a piece of the very important educational achievement puzzle may be missing.

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